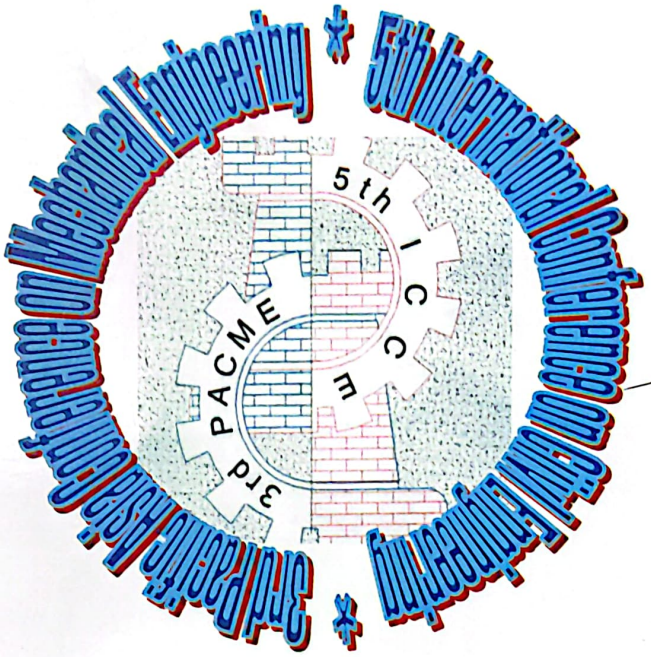
WELCOME DELEGATES;

THE 5TH INTERNATIONAL CONFERENCE ON CIVIL ENGINEERING
THE 3RD PACIFIC ASIA CONFERENCE ON MECHANICAL ENGINEERING



Theme: Towards Developing a Global Engineering Community:
(Contributions, Trends and Prospects of Civil and Mechanical Engineering in the Emerging Global Technology)

Organized and conducted by:

TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES
INTEGRATED RESEARCH AND TRAINING CENTER
MANILA, PHILIPPINES

NIHON UNIVERSITY
COLLEGE OF SCIENCE AND TECHNOLOGY
TOKYO, JAPAN

INTEGRATED RESEARCH AND TRAINING CENTER
FOUNDATION, INC.,

August 29-31, 2002
Manila Midtown Hotel, Manila, Philippines

日本大学

NIHON UNIVERSITY
COLLEGE OF SCIENCE AND TECHNOLOGY

Expresses Congratulations
For the Success of

The 5th INTERNATIONAL CONFERENCE ON CIVIL ENGINEERING (5 ICCE)

and

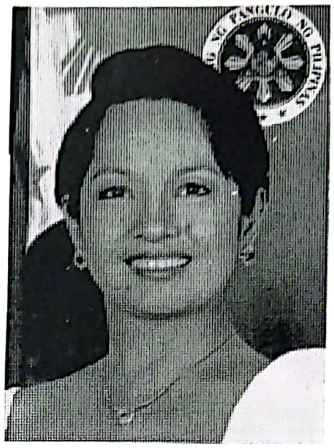
THE 3rd PACIFIC ASIA CONFERENCE ON MECHANICAL ENGINEERING (3 PACME)

August 29-31, 2002
IRTC-TUP Manila, Philippines

From

Dr. KATSUE KOJIMA, Dr. of Eng'g
Dean College of Science and Technology

Office of the President
of the Philippines
Malacañang



Message

My warmest felicitations to the organizers and participants to the ***3rd Pacific Asia Conference on Mechanical Engineering (3PACME)*** and the ***5th International Conference on Civil Engineering (5ICCE)***

I laud the Technological University of the Philippines in cooperation with Nihon University of Japan for putting together this year's conference that will focus on ways to further develop the fields of civil and mechanical engineering. Your strategic partnership with the government in promoting a humane environment is truly laudable.

This year's theme "*Towards Developing a Global Engineering Community: (Contributions, Trends and Prospects of Civil and Mechanical Engineering in the Emerging Global Technology)*", speaks well of your commitment to uplift the standards of the industry and ensure grater productivity in our country. I urge you to keep abreast of the latest trends technology in these fields to help you respond to development challenges with more efficiency.

I hope these events will continue to inspire civil and mechanical engineers in the Philippines and Japan to persevere in their mission to built a better future for our peoples. Let us work together in steering our nation towards greater economic stability.

Mabuhay kayong lahat!

GLORIA MACAPAGAL-ARROYO

Manila
29 August 2002

Republic of the Philippines
OFFICE OF THE PRESIDENT
COMMISSION ON HIGHER EDUCATION

Message

Our warmest greetings to the organizers, guests and participants of the **3rd Pacific-Asia Conference on Mechanical Engineering (3PACME) and 5th International Conference on Civil Engineering (5ICCE)** on August 29-30 2002.

Your conference theme *"Towards Developing a Global Engineering Community: Contributions, Trends and Prospects of Civil and Mechanical Engineering in the Emerging Global Technology"* is timely and relevant as we must keep pace with developments in the global environment to be able to respond to the changing needs of the education community.

The acceptance of the Philippines in the APEC Engineering Register is the Major achievement we should continue to build upon. We thus hope that this important gathering will serve as a venue for strengthening both personal and institutional linkages and help us reach our goals of human capacity building for global competitiveness.

Mabuhay!

ESTER A. GARCIA
Chairperson

Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY

Message

On behalf of the Department of Science and Technology, I wish to express our warmest greetings to the Technological University of the Philippines on this significant occasion – the holding of simultaneous scientific conferences in cooperation with Nihon University of Japan and various professional engineering groups.

These conferences with the overall theme *"Towards Developing a Global Engineering Community: Contributions, Trends and Prospects of Civil and Mechanical Engineering in the Emerging Global Technology"* should give the participants a good insight on the challenges the engineering field faces as it strives to be relevant in a knowledge –driven Philippine society in the 21st century.

May you be inspired to work harder and smarter in addressing the needs and concerns of the country's civil and mechanical engineering fields through programs and activities in the areas of education, research and development, and industrial networking.

Congratulations to the Technological University of the Philippines and its Integrated Research and Training Center for putting up this worth while event!

Mabuhay!

ESTRELLA F. ALBASTRO
Secretary

Republic of the Philippines
TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES
Ayala Blvd., Ermita, Manila, Philippines
Phone and Fax: (632)-523-2293 Website: www.tup.edu.ph

Message

It is with great honor and privileged that I take this opportunity to extend my warmest congratulations to the participants of the *5th International Conference on Civil Engineering (5ICCE) and the 3rd Pacific Asia Conference on Mechanical Engineering (3PACME)* on August 29-31, 2002 at the Manila Midtown Hotel, Manila, Philippines.

The theme of this year's joint conference *"Towards Developing A Global Engineering Community: Contributions, Trends and Prospects of Civil and Mechanical Engineering in the Emerging Global Technology"* is very timely for those of us in the Academe in facing the challenges brought about by Information and Communication Technology.

With endeavors of this kind, I am very confident that it will help learning institutions to carry out their mission on Instruction in developing future Civil and Mechanical Engineers with world class skills and respond to the movement of a knowledge-based economy.

The collaboration of the Technological University of the Philippines and Nihon University of Japan will continue to enhance initiatives to sustain the Universities development efforts in providing the people with quality education as its contribution in forging a prosperous global community.

Mabuhay and best wishes for a very successful event.

FEDERSERIO C. CAMARAO, Ph.d.
President

NIHON UNIVERSITY

COLLEGE OF SCIENCE & TECHNOLOGY

1-8, KANDA SURUGADAI, CHIYODA-KU,

TOKYO, 101-8308 JAPAN

日 本 大 學

Message

It is my pleasure to extend warm greetings to all the participants of the Fifth International Conference on Civil Engineering-5th ICCE- and the Third Pacific-Asia Conference on Mechanical Engineering-3rd PACME- to be held in Manila on August 29-31,2002.

A change in global trends is occurring rapidly in all fields. It is essential that we should always cope with the changes and the new situation. Both civil and mechanical engineers and researchers are grappling with the changes and the situation in building and arranging social infrastructure, Hence, the ICCE and the PACME held together as a joint conference will provide an opportunity in addressing the challenges and for developing a global community.

I am honored to be given the opportunity to participate in these undertakings, and I hope that this collaboration with the Technological University of the Philippines would further promote and strengthen friendship between the Philippines and Japan.

I admire the great efforts of all the staff of the Integrated Research and Training Center, the faculty members of TUP and other contributions. I also would like to express my gratitude to all who worked hard for the success of these conferences.

Professor KATSUE KOJIMA
Dean of the College of Science and Technology
Nihon University

DEPARTMENT OF TRANSPORTATION
ENGINEERING & SOCIO-TECHONOLOGY

COLLEGE OF SCIENCE AND TECHNOLOGY
NIHON UNIVERSITY

7-24-1 NARASHINODAI,FUNABASHI,CHIBA 274-8501,JAPAN

日 本 大 學

Message

I consider it an honor and privilege to extend my greetings to the participants of the Fifth International Conference on Civil Engineering to be held at Manila Midtown Hotel in Manila on August twenty-nine to thirty-one, 2002.

The waves of globalization come rapidly against every field. We, civil engineers face always the waves for realizing sustainable development. It is really expected that the Fifth International Conference on Civil Engineering would perform an important role for how we deal with globalization for our society. It is our hope that the conference will bring all the participants fruitful results and products of better understanding the complex problems in civil engineering field.

I wish to express my appreciation to the Integrated Research and Training Center staff, faculty members of the Technological University of the Philippines and other various people who support to hold the conference. I admire their sparing efforts for the successful conference.

I would like to extend my sincerest congratulations and best wishes for a most fruitful conference.

K. Makiuchi

Professor KATSUHIKO MAKIUCHI
Chairman
Department of Transportation Engineering and
Socio-Technology College of Science and Technology
Nihon University

Technological University of the Philippines
INTEGRATED RESEARCH AND TRAINING CENTER
Ayala Blvd., Manila

Message

The Integrated Research and Training Center (IRTC) shares the responsibility of the Technological University of the Philippines in promoting quality education. In the process, the Center contributes to the training of a critical mass of S&T professionals and produces vital technologies for development.

In consonance with its mandate, IRTC organizes the International Conference on Civil Engineering (ICCE) and the Pacific-Asia Conference on Mechanical Engineering (PACME). The two biennial conferences provide the appropriate forums for the presentation of research results, thus, facilitating wide dissemination and immediate feedback. The interaction among researchers and the formation of professional networks are anticipated outcomes of the conferences. In addition, the ICCE and PACME give engineers motivation and direction in the pursuit of their profession during the trying years of the new world order.

It is with genuine pleasure that I welcome the participants and guests to the ICCE and PACME, and I thank all those who collaborated with IRTC in the organization and conduct of the conferences. I hope that those present shall derive the best benefit from the occasions.

I am truly honored to be a part of these professional undertakings.

Nenet C. Graza

NENET C. GRAZA
Director, IRTC

COMPOSITE PROGRAM
5th International Conference on Civil Engineering
3rd Pacific Asia Conference on Mechanical Engineering

Day 1 – 29 August 2002
Time 09:00-10:00

Session 1 – OPENING CEREMONIES
(Master of Ceremonies – Prof. Nenet C. Graza)

10:00-10:20 **COFFEE BREAK**

10:20-12:00 **Session 2A/2B**

PLENARY SESSION

Chair: **Dr. Shigeo Iwai (NU)**
Vice Chair: **Prof. Bernardo Lejano (TUP)**

- INFORMATION TECHNOLOGY AND CALS/EC IN CONSTRUCTION INDUSTRY IN JAPAN, *(T. Shimazaki)*
- ASSESSMENT AND REPAIR OF A 29-SPAN REINFORCED CONCRETE BRIDGE IN MALAYSIA, *(P. Singh)*
- HIGH VOLUME FLY ASH UTILIZATION IN HIGH-FLOWABLE SELF-COMPACTING CONCRETE, *(N. Diola)*

Session 2C – Maintenance and Manufacturing Engineering.
Chair: **Prof. H.S. Lee**
Vice Chair: **Prof. L.G. Aguila**

- A STUDY OF FORMING FLANGE WITH GROOVES IN THE OUTER SURFACE BY USING THICK METAL PLATE, *(T. Maegawa)*
- PERFORMANCE EVALUATION AND EFFICIENCY TEST OF SAWDUST, RICE HUSK AND CHARCOAL FIRED MECHANICAL DRYER UTILIZING OUTSIDE AIR AND RE-CIRCULATED AIR FOR THE PURPOSE OF WASTE HEAT RECOVERY, *(A. B. Maglaya)*
- A STUDY OF THE DATABASE FOR AN EXTRUSION PROCESS DESIGN, *(K. Matsuzawa)*
- DESIGN AND EVALUATION OF A WATER PUMPING WINDMILL FOR SMALL SCALE IRRIGATION, *(P. O. Anino, Sr.)*
- DESIGN AND DEVELOPMENT OF A TWO-MOLD COMPACTOR, *(L. Ramirez)*

Session 2D – Energy and Thermodynamics
Chair: **Prof. K. Yoshida**
Vice Chair: **Prof. V.J. Angeles**

- INFLUENCE OF HOT RESDUAL GAS ON COMBUSTION USING ALCOHOL FUEL, *(A. Iijima)*
- EXPERIMENTAL RESEARCH CONCERNING OF THE COMBUSTION STATE AND EXHAUST GAS COMPOSITION OF A SMALL 2-CYCLE ENGINE, *(T. Morinaga)*
- AN ANALYSIS AND EVALUATION OF PHILIPPINE CALATRAVA COAL- DIESEL OIL MIXTURES AS SLURRY FUEL FOR INDUSTRIAL PURPOSES, *(A.B. Maglaya)*
- AN ANALYSIS OF LIGHT EMISSION INTENSITY BEHAVIOR MEASURED SIMULTANEOUSLY IN DIFFERENT POINTS OF THE COMBUSTION CHAMBER *(A. Kakishima)*

Session 2E – Robotics, Dynamics and Biomechanics
Chair: **Prof. K. Miura**
Vice Chair: **Prof. F. M. Argamosa**

- SYNTHESIS OF ROBUST LANE-FOLLOWING CONTROL SYSTEM USING STOCHASTIC PARAMETER TUNING, *(A. Kobayashi)*
- OPTIMIZATION OF VCEHICLE TRAJECTORIES FOR EMERGENCY OBSTACLE AVOIDANCE, *(R. Hirao)*
- STOCHASTIC ROBUSTNESS SYNTHESIS OF NONLINEAR VEHICLE DYNAMICS CONTROLLER, *(M. Nishimura)*
- RE-DESIGN OF INDUSTRIAL BEVERAGE CRATE WASHING MACHINE, *(E.J. Calilung)*

13:20-15:00 **Session 3A – Structural Engineering**
Chair: **Dr. Bernardo Lejano (TUP)**
Vice Chair: **Engr. Jesus Manalastas (TUP)**

- HIGH STRENGTH CONCRETE MODELING BY ARTIFICIAL NEURAL NETWORKS, *(T. Ng)*
- IDENTIFICATION OF DYNAMIC MODEL OF RC BUILDING, *(A. Abudula)*

- REPORT OF DAMAGE INVESTIGATION IN TAIWAN AFTER THE CHI-CHI EARTHQUAKE, *(M. Nakanishi)*
- LOAD EFFECT FOR HABITABILITY LIMIT STATE OF OCEANIC ARCHITECTURAL BUILDINGS AND THE EVALUATION OF HABITABILITY BY VERTICAL MOTION, *(Y. Saito)*
- DESIGN WAVE LOAD ACTING ON FLOATING ARTIFICIAL BASE BY DIFFRACTION THEORY, *(H. Eto)*
- FLEXURAL BEHAVIOR OF PRECAST BLOCK BEAMS USING EXTERNAL PRESTRESSING METHOD, *(Y. Yaginuma)*

Session 3B – Transportation Engineering
Chair: **Dr. Koichi Amano (NU)**
Vice Chair: **Engr. Ma. Richie Calbal (TUP)**

- A BASIC STUDY ON THE RELATION BETWEEN EVOLUTION OF TRANSPORTATION AND URBAN DEVELOPMENT IN BANGKOK, *(K. Amano)*
- EVALUATION OF URBAN ROAD CARBON MONOXIDE (CO) DISPERSION, *(M. Muhl)*
- THE IMPACT OF TRAFFIC COUNTERMEASURE AT A BUS STOP OF EPIFANIO DE LOS SANTOS AVENUE (EDSA), METRO MANILA, *(M. Ozaki)*
- THE STUDY ON AIR TRANSPORT IN EAST ASIA, *(H. Sasaki)*
- SIMULATION MODEL OF CAR SHARING SYSTEM FOR ELECTRIC VEHICLE, *(S. Shimohara)*

Session 3C – Maintenance and Manufacturing Engineering
Chair: **Prof. T. Yamada**
Vice Chair: **Prof. L.B. Ramirez**

- ANALYSIS OF CONFORM EXTRUSION, *(M. Yoshida)*
- A STUDY OF PRESS-BENDING WITH INNER PAT OF ALUMINUM SECTIONS, *(S. Fujita)*
- COMPARATIVE PERFORMANCE OF A ROTARY-DRUM TYPE AND LIQUID-ASSISTED MECHANICAL DRIVEN GARLIC PEELERS WITH ROLLERS, *(F. R. M. Argamosa)*
- THE FORMING OF A SPUR GEAR MADE FROM THE DRAWN CUP, *(Y. Ukei)*
- PERFORMANCE EVALUATION OF WATER-TO-AIR HEAT EXCHANGER AIR COOLER, *(R.C.P. Hizon)*
-
-

Session 3D – Energy and Thermodynamics
Chair: **Prof. H. Shoji**
Vice Chair: **Engr. B. Fortaleza**

- COMBUSTION CHARACTERISTICS OF MONO-SIZED PARTICLE GROUP IN SUPER CRITICAL ENVIRONMENTS, *(T. Matsumura)*
- COMPRESSOR TYPE AND INPUT POWER EFFECTS ON THE TEMPERATURE-TIME CHARACTERISTICS OF A SPLIT TYPE AIR CONDITIONER, *(R. C. Nunez)*
- BURNING VELOCITY OF THE FLAME PROPAGATES THROUGH FUEL CONCENTRATION GRADIENT, *(K. Yamaguchi)*
- EXPERIMENTAL STUDY OF BIOMASS COMBUSTION IN A FIX BED COMBUSTION SYSTEM, *(A. Surjosatuyo)*
- A STUDY ON CONDENSATION JET BY USING LLS AND WAVELETS MULTI RESOLUTION, *(M. Kimura)*

Session 3E – Robotics, Dynamics and Biomechanics
Chair: **Prof. S. Horiuchi**
Vice Chair: **Dr. E. Dadios**

- DISCUSSION ON THE ROTATIONAL MOTION OF A FLEXIBLE BODY (THE FIRST REPORT: DEFINITION OF THE ANGULAR ROTATIONAL MOTION), *(A. Mitamura)*
- DEFINITION OF ANGULAR ROTATIONAL MOTION (THE 2ND REPORT: ON KINETIC ANALYSIS OF A SHOT PUT MOTION), *(T. Katsuragi)*
- WORK SPACE FOR A FREE-FLOATING VARIABLE GEOMETRY TRUSS, *(K. Mimura)*
- CONTROL OF UNICYCLE ROBOT BY MULTIDIMENSIONAL FUZZY RULES, *(K. Ukiya)*
- THREE DIMENSIONAL MEASUREMENT OF MICRO SHAPE, . *(T. Yamada)*

15:20-17:00

Session 4A – Structural Engineering
Chair: ***Dr. Mitsukazu Nakanishi (NU)***
Session Chair: ***Engr. Christopher Chan (TUP)***

- RESPONSE ANALYSIS OF FLOATING ARTIFICIAL BASE-BUILDING OF FRAMED STRUCTURAL MODEL BY WAVE FORCES, *(K. Kamekawa)*
- CHART OF NATURAL FREQUENCY OF ELASTIC PLATE *(K. Maruyoshi)*
- MOTION ANALYSIS OF FLOATING STRUCTURE BY WAVE LOADS BASED ON RIGID ELASTIC BODY ASSUMPTION, *(O.Saijo)*

- A STUDY ON DYNAMIC CHARACTERISTICS OF MOCK-UP PILE FOUNDATION MODELS PART I – AN OUTLINE OF FORCED VIBRATION TEST, *(Y. Shimomura)*
- A STUDY ON DYNAMIC CHARACTERISTICS OF MOCK-UP PILE FOUNDATION MODELS PART II – DYNAMIC FEATURES OF ADJACENT FOUNDATIONS, *(Y. Shimomura)*

Session 4B – Transportation Engineering
Chair: **Dr. Prof. Alexis M. Fillone (DLSU)**
Vice Chair: **Engr. Edgardo Legaspi (TUP)**

- ON A HISTORY AND A PRESENT CIRCUMSTANCE OF WALKING AID FOR PERSONS WITH VISUAL IMPAIRMENT IN JAPAN, *(H. Sekiguchi)*
- LEVEL OF BARRIER-FREE OF THE PUBLIC TOILET IN TOKYO, *(H. Nakamoto)*
- TRAFFIC SIMULATION: A NEW TOOL FOR TRAFFIC IMPACT ASSESSMENT IN THE PHILIPPINES, *(R. Galiza)*
- ON THE GIS USING TIME SERIES DATA IN NORTHWEST AREA IN CHIBA, *(Y. Kato)*

Session 4C – Maintenance and Manufacturing Engineering
Chair: **Prof. T. Nishimura**
Vice Chair: **Prof. R. de Lumen**

- THREE DIMENSIONAL MEASUREMENT OF MICRO SHAPE, *(T. Yamada)*
- DEVELOPMENT OF A MICRO XY STAGE FOR MICRO MACHINING, *(H.S. Lee)*
- DETECTION OF OPERATION ABNORMALITY OF BALL BEARING WITH ULTRASONIC TECHNIQUE, *(A. Takeuchi)*
- DESIGN AND FABRICATION OF MECHANICAL DRYER TRAINING APPARATUS USING INDIGENOUS WASTE MATERIAL, *(L.F. Hidalgo)*

Session 4D – Energy and Thermodynamics
Chair: **Prof. S. Moriya**
Vice Chair: **Engr. R.C.P. Hizon**

- COMBUSTION ENHANCEMENT BY THERMO-ACOUSTIC STREAMING, *(M. Tanabe)*
- COCONUT BIO-FUEL, AN ENERGY RESOURCE IN THE FUTURE: EXPLORING THE PROSPECTS OF CME, A VIABLE ALTERNATIVE OF FOSSILS FUELS IN THE PHILIPPINES, *(P.S. Roxas)*
- AN EXPERIMENTAL STUDY OF THE INFLUENCE OF FUEL TEMPERATURE ON COMBUSTION AND IGNITION CHARACTERISTICS OF COMPRESSION IGNITION ENGINE, *(M. Kubota)*
- EFFECT OF COMPRESSION RATIOS OF ENGINE PERFORMANCE AND EMISSION OF A CNG FUELLED ENGINE, *(M. Ali Sera)*

Session 4E – Engineering Education
Chair: **Prof. M. Okano**
Vice Chair: **Prof. P.S. Roxas**

- THE SCADA SYSTEM OF WESTERN VISAYAS COLLEGE OF SCIENCE AND TECHNOLOGY, *(G.G. Hisole)*
- INCORPORATING CONTROLS IN ME: THE DLSU EXPERIENCE, *(A.Y. Chua)*
- TECHNOPRENEURSHIP: RE-ENGINEERING ENGINEERING EDUCATION, *(A. Licaros-Velasco)*
- MECHATRONIC CONCENTARTION IN THE MECHANICAL ENGINEERING PROGRAM AT DE LA SALLE UNIVERSITY-MANILA, *(M.C. Belino)*

Day 2 – 30 August 2002

8:20-10:00

Session 5A – Construction Materials and Methods
Chair: **Dr. Royce Ratcliffe (BOSFA)**
Vice Chair: **Engr. Renato Gopez (BSU)**

- DEVELOPMENT OF UTILIZATION TECHNOLOGIES FOR MT. PINATUBO EJECTA AS PRIME MATERIALS FOR CONCRETE (PART 1-CONCRETE MATERIALS STRUCTURE-PROPERTY CHARACTERIZATION) *(R. Baarde)*
- DEVELOPMENT OF PRECAST R/C HOUSE CONSTRUCTION UTILIZING THE MT. PINATUBO EJECTA PART 2 ARCHITECTURAL AND STRUCTURAL DESIGN CONCEPT, *(R. Irabon)*
- DEVELOPMENT OF PRECAST R/C HOUSE CONSTRUCTION UTILIZING THE MT. PINATUBO EJECTA PART 3 PERFORMANCE TEST OF FULL-SCALE STRUCTURE, *(M. Nakanishi)*
- CONSTRUCTION METHOD OF HOUSING ON WATER IN PUERTO PRINCESA CITY, PALAWAN, PHILIPPINES, *(D. (Espression)*
- STRUCTURAL AND ECONOMIC COMPARISON BETWEEN THE CONVENTIONAL AND STACKING METHOD OF LAYING LOCALLY MANUFACTURED NON-LOAD BEARING CONCRETE HOLLOW BLOCKS (CHBS) IN ILOCOS SUR, *(N. Esguerra)*

Session 5B – Pavement Engineering
Chair: **Dr. Haruyuki Nakayama (NU)**
Vice Chair: **Engr. Manuel Muhi (PUP)**

- DESIGN AND STRUCTURAL ANALYSIS BY SURFACE DEFLECTION OF ILB PAVEMENT, *(D. Pagbilao)*
- BASIC STUDY ON HEAT BALANCE AT PAVEMENT SURFACE, *(S. Kamo)*
- EVALUATION OF VARIOUS POLYMER MODIFIED BINDERS FOR POROUS ASPHALT MIX, *(A. Valera)*
- PROPERTIES OF CRUMB RUBBER-MODIFIED ASPHALT AND ASPHALT MIXTURE, *(M. Aala)*
- LABORATORY INVESTIGATION OF RECLAIMED ASPHALT PAVEMENT (RAP) FOR ASPHALT SURFACING, *(S.L. Ignacio)*

Session 5C/5D/5E
PLENARY SESSION

Chair: **Prof. N.C. Graza (TUP)**
Vice Chair: **Prof. Adora S. Pili (TUP)**

- CAPACITY BUILDING FOR ENGINEERS, *(R. B. Vea)*
- STRESS ANALYSIS ON FUNCTIONALLY GRADIENT MATERIALS, *(T. Nishimura)*

Session 6A/6B
PLENARY SESSION

Chair: **Dr. Osamu Saijo (NU)**
Vice Chair: **Engr. Teodinis P. Garcia (TUP)**

- STEEL FIBRES & MESH – JUST HOW DO THEY COMPARE *(R. Ratcliffe)*
- OUTLINES OF DAMAGE EVALUATION, SEISMIC CAPACITY EVALUATION AND RETROFIT TECHNIQUES OF R/C BUILDINGS IN JAPAN *(K. Kitajima)*
- CHARACTERISTICS OF LONG PERIOD OSCILLATIONS IN A HARBOR BASED ON FIELD MESUREMENTS *(E. Cruz)*

Session 6C – Strength of Materials and Materials Science
Chair: **Prof. T. Nishimura**
Vice Chair: **Engr. R. Basaen**

- STRESS ANALYSIS OF ADHESIVE JOINTS USING MESHLESS METHOD, *(T. Saito)*
- ELECTRO-MAGNETIC INDUCTION CHARACTERISTICS OF REINFORCING BARS BURIED IN CONCRETE, *(O. Yokota)*
- STRESS ANALYSIS OF SPOT WELDED JOINTS USING ELEMENT FREE GALERKIN METHOD, *(K. Kamei)*
- THE TENSILE STRENGTH OF CRYOGENICALLY PROCESSED PITCH COPPER, *(A.R. Malibiran)*
- THERMO-ELASTO-PLASTIC ANALYSIS OF A THIN PLATE SUBJECTED THE LASER IRRADATION (RE-YIELDING CONDITION FOR THE SECOND IRRADATION) *(T. Ouchi)*

Session 6D – Energy and Thermodynamics
Chair: **Prof. M. Tanabe**
Vice Chair: **Engr. J. Yasay**

- A STUDY ON THE DIFFUSIVE COMBUSTION INDUCED BY HIGH VOLTAGE ELECTRICAL DISCHARGE, *(T. Tomizawa)*
- COOLANT TEMPERATURE EFFECT ON GASOLINE ENGINE FUEL CONSUMPTION, *(A/L Rajoo)*
- COMBUSTION PHENOMENA UNDER CORONA DISCHARGE APPLICATION IN A VESSEL, *(T. Kadono)*
- INPUT POWER EFFECTS ON THE TEMPERATURE-TIME CHARACTERISTIC OF DOMESTIC REFRIGERATORS USING R-134A REFRIGERANT, *(R.C. Nunez)*
- AN EXPERIMENTAL STUDY OF THE EFFECT OF A SMALL-PULSED JET ARRAY ON THE VELOCITY PROFILE OF A CHANNEL FLOE FOR THE FRICTION DRAG REDUCTION, *(N. Miyagi)*

Session 6E – Fluid Mechanics
Chair: **Prof. M. Kimura**
Vice Chair: **Dr. R. Tan**

- CT IMAGE RECONSTRUCTION USING THE SAMPLE PATTERN MATCHING METHOD AND ITS APPLICATION TO MULTIPHASE FLOW, *(M. Takei)*
- PARTICLE DENSITY EVALUATION IN TWO PHASE FLOW USING STATE TRANSTION MATRIX, *(Y. Tsutsumi)*
- DEVELOPMENT OF A NEW HOT-WIRE ANEMOMETRY FOR MEASURING A THIN BOUNDARY-LAYER FLOW,
- *(M. Minato)*

- MODEL EXPERIMENT ON MICRO-PRESSURE WAVE RADIATED FROM TUNNEL EXIT WITH HOOD, *(S. Nagai)*
- ESTABLISHMENT OF A CENTER FOR MICRO-HYDRO TECHNOLOGIES AT DE LA SALLE UNIVERSITY-MANILA *(G.C. Salazar)*

13:20-15:00

Session 7A – Construction Materials and Methods
Chair: **Dr. Nathaniel Diola (UP)**
Vice Chair: **Engr. Junpei Saito (NU)**

- STEEL FIBER REINFORCED CONCRETE USED IN THE CONSTRUCTION OF FLOOR SLAB FOR SM WAREHOUSE IN PARAÑAQUE, *(F. How)*
- INFLUENCE OF SLAG AND FLY ASH ON THE HARDENED PROPERTIES OF CEMENT-LAHAR SAND CONCRETE PAVING BLOCK, *(J. Agron)*
- UTILIZATION OF MINE TAILINGS FROM COPPER-GOLD MINING PROCESS AS FINE AGGREGATES OF ROLLER COMPACTED CONCRETE, *(R. Gopez)*
- INITIAL INVESTIGATION ON USING MT. PINATUBO LAHAR COARSE AGGREGATES WITH HIGH VOLUME OF FLYASH FOR SELF-COMPACTING CONCRE *(D. Pagbilao)*

Session 7B – Preservation of Natural Treasures and Historical Structures;
Chair: **Dr. Toshikazu Shimazaki (NU)**
Vice Chair: **Engr. Prospero Cabornay (TUP)**

- THE STUDY OF AN EVALUATION MODEL ON MODERN CIVIL ENGINEERING INFRASTRUCTURES – THE CASE STUDY OF THE WATER POWER PLANTS, *(Y. Horikawa)*
- COVERED BRIDGES WITH SMALL TEMPLES IN BHUTAN, *(T. Itoh)*
- A STUDY ON ENVIRONMENTAL PROTECTION OF LAKES – TAKING THE CASE OF WATER ENVIRONMENT OF LAKE INBANUMA, *(Y. Morita)*
- STATE-OF-THE-ART PASSIVE FINE STOPPING SYSTEM APPLICATION IN BUILDING, *(P. Jorillo)*

Session 7C – Strength of Materials and Materials Science
Chair: **Prof. A. Okabe**
Vice Chair: **Prof. F. Balanay, Jr.**

- CORROSION RESISTANCE OF CRYOGENICALLY TREATED PITCH COPPER, *(L.G. Aguila)*
- DEFORMATIONAL BEHAVIOR OF PLASTIC HINGE IN A CIRCULAR PLATE AND ELASTIC ANALYSIS CONSIDERING LARGE DEFLECTION *(T. Nakagawa)*
- THE EFFECT OF CRYOGENIC PROCESSING ON THE ELECTRICAL CONDUCTIVITY OF PITCH COPPER *(L.G. Aguila)*
- TORSIONAL ANALYSIS OF FUNCTIONALLY GRADED MATERIALS, *(M. Ueda)*
- SPECTRALLY SELECTIVE THIN-FILM COATING FOR FLAT-PLATE COLLECTOR, *(R.C. Muhi)*

Session 7D – Measurement and Control
Chair: **Prof. T. Sekine**
Vice Chair: **Dr. R.C. Nuñez**

- DEVELOPMENT OF A LIGHT WEIGHT MASTICATION MOTION MEASUREMENT DEVICE WITH MECHANICAL LINK *(N. Kawahata)*
- A 3-DIMESIONAL POSITION AND ATTITUDE MEASUREMENT SENSOR USING PSD AND 4LED'S ON THE APICES OF A TETRAHEDRON *(N. Kawahata)*
- MEASUREMENT METHOD OF POSTURE AND MOVEMENT FOR HUMAN USING AN ACCELEROMETER, *(T. Sugimoto)*
- NONLINEAR TRACKING CONTROL LAW FOR A LUNAR LANDER, *(A.Abe)*
- DESIGN OF OPTICMAL GUIDANCE AND TRACKING CONTROL FOR A SPACECRAFT, *(K. Uchiyama)*

Session 7E – Environmental Eng'g Waste Management
Chair: **Prof. H. Shioji**
Vice Chair: **Dr. A. S. Mansilla**

- A FEASIBILITY STUDY ON THE USE OF BLENDED FUEL FOR DIESEL ENGINES (CASE OF METHYL-ESTERIFIED WASTE EDIBLE OIL AND KEROSENE), *(H. Takeda)*
- AN ATTEMPT TO USE WASTE EDIBLE OIL-KEROSENE MIXTURE IN DIESEL ENGINE (CHANGE OF CHARACTERISTICS BY HEATING), *(K. Takeda)*
- LIFE-CYCLE ENVIRONMENTAL BENEFITS OF USING BIOETHANOL AS A GASOLINE ADDITIVE, *(R. R. Tan)*
- LAND USE AND CARBON BALANCE IMPLICATIONS OF COCONUT BIODIESEL UTILIZATION IN THE PHILIPPINE AUTOMOTIVE TRANSPORT SECTOR, *(R.R. Tan)*
- A STUDY ON SUITABLE INJECTION PRESSURE OF DIESEL SPRAY WITH ULTRA HIGH PRESSURE, *(J.D. Yong)*

15:20-17:00

Session 8A – Construction Materials and Methods
Chair: **Dr. Mitsukazu Nakanishi (NU)**
Vice Chair: **Engr. Edmundo dela Cruz (TUP)**

- MECHANICAL BEHAVIOR OF IMPROVED SUPER LIGHTWEIGHT CONCRETE BEAMS BY PRESTRESSING, *(Y. Yaginuma)*
- CHARACTERIZATION OF THE PROPERTIES OF BATANGAS COAL-FIRED THERMAL POWER PLANT'S (BCFTPP'S) BOTTOM ASH STABILIZED WITH CEMENT, *(R. Baarde)*
- INFLUENCE OF PHILIPPINES GROUND FURNACE SLAG ON THE FRESH AND MECHANICAL PROPERTIES OF CONCRETE, *(J.G. Argon)*
- CONTROLLED CRACK PROPAGATION IN CONCRETE COMPOSITE STRUCTURES, *(P. Jorillo)*
-

Session 8B – Geotechnical Engineering
Chair: **Dr. Shigeo Iwai (NU)**
Vice Chair: **Engr. Dominador Pagbilao (TUP)**

- MECHANICAL CHARACTERISTICS OF LIGHTWEIGHT GEOMATERIAL UNDER CYCLIC LOADING *(K. Minegishi)*
- GEOFORM TRENCH WALL METHOD FOR REDUCING GROUND VIBRATION *(Y. Mizutani)*

Session 8C – Strength of Materials and Materials Science
Chair: **Prof. Y. Kato**
Vice Chair: **Dr. M. Belino**

- BAUSCHINGER EFFECT ON THE STRAIN HARDENING REGION *(T. Nakamura)*
- EFFECT OF ANNEALING TREATMENT ON CUBIC BORON NITRIDE COATED ON STEEL SUBSTRATE, *(E. Hamzah)*
- ANALYSIS OF ELASTO-PLASTIC BUCKLING OF A PRISMATIC SHELL COLUMN, *(Y. Takayama)*
- AN INNOVATIVE APPROACH IN SOLVING PHASE DIAGRAM PROBLEMS IN PLAIN CARBON STEELS USING MS VISUAL C** COMPUTER PROGRAM, *(R.C.Nuñez)*
- ELASTO-PLASTIC RESPONSE OF A BAR BY AN OSCILLATORY BENDING MOMENT AND TWISTING MOMENT, *(M. Akamoto)*

Session 8D – Measurement and Control
Chair: **Prof. N. Kawahata**
Vice Chair: **Dr. J.E. Gonzales**

- EFFECTIVE PRESENTATION METHOD OF INFORMATION TO DRIVER – EXPERIMENTAL CONSIDERATION OF DRIVER BEHAVIOR PART 1, *(T. Nishiyama)*
- THE EFFECT OF AN INFORMATION PRESENTATION METHOD TO DRIVER BEHAVIOR – EXPERIMENTAL CONSIDERATION PART 2, *(T. Nagatsuka)*
- FUNDAMENTAL ANALYSIS TOWARD FOUR WHEEL INTEGRATED CONTROL VEHICLES, *(T. Takanashi)*
- EXPERIMENTAL STUDY ON DRIVER'S CHARACTERISTICS WITH INTENSIVE AND DISPERSIVE DISPLAY UNITS TO OFFER INFORMATION, *(T. Sekine)*
- GENETIC ALGORITHM CONTROLLER FOR HIGHLY NONLINEAR SYSTEM *(E. P. Dadios)*

Session 8E – Environmental Eng'g Waste Management
Chair: **Prof. K. Yoshida**
Vice Chair: **Dr. A. Maglaya**

- STUDIED OF ADAPTABILITY FOR DIESEL ENGINE FROM COAL LIQUEFIED OIL (CASE OF LIGHT NAPHTHA & FRACTION GAS OIL) *(S. Moriya)*
- STREAMLINED ENVIRONMENTAL LIFE-CYCLE ASSESSMENT USING FUSSY SEMI -QUANTITATIVE EVALUATION MATRICES, *(R.R.Tan)*
- A METHODOLOGY FOR ENVIRONMENTAL IMPACT AND PRODUCTIVITY ANALYSIS OF A SEMICONDUCTOR ASSEMBLY/ PACKAGING OPERATION, *(R. P. Henson)*
- BIOREMEDIATION: UTILIZATION OF PSEUDOMONAS AERUGENOSA IN THE DEGRADATION OF WASTE AUTOMOTIVE ENGINE OIL, *(A.T. Mansilla)*

17:00-17:30 **Session 9**

Closing Ceremonies
(Master of Ceremonies – Prof. Nenet C. Graza)

17:30 **Cocktails**

ABSTRACT OF PAPERS

5th International Conference on Civil Engineering (5 ICCE)

PLENARY LECTURES

INFORMATION TECHNOLOGY AND CALS/EC CONSTRUCTION INDUSTRY IN JAPAN

T. SHIMAZAKI
Department of Civil Engineering
College of Science and Technology, Nihon University,
Tokyo, Japan
shimazak@civil.cst.nihon-u.ac.jp

Abstract:

Although information technology has been fully used in industries in Japan, it has not been used widely for networking among companies. Since 2001, Ministry of Land, Infrastructure and Transport started bidding system through Internet, and the submission of contract products by digital media, which is called as CALS/EC. Some local governments also started electronic bidding system. It will be applied to all public works from 2004. General contractors applying to public works need to adjust their system to the situation. The paper overviews the history of information technology application in Japan, points out issues of application of information technology in construction industry, and quantitatively analyzes several of influences of the information technology, namely influence to the effectiveness of communication, organization structure, and biding price reduction. Lastly, it proposes the countermeasures to overcome the issues from the viewpoints of network infrastructures, software, hardware, etc. for future development of the construction industry.

ASSESSMENT AND REPAIR OF A 29 SPAN REINFORCED CONCRETE BRIDGE IN MALAYSIA

PARNAM SINGH
RNC Technology (M) Sdn Bhd, Puchong, Selangor, Malaysia

HILMI BIN MAHMUD
Dept of Civil Engineering, University of Malaya,
Kuala Lumpur, Malaysia

Abstract:

This paper highlights one company's experience in the assessment and repair of a 40-year old reinforced concrete bridge in one of the states in Malaysia, i.e Kelantan. The 29-span bridge is situated along a key trunk road spanning across the Kelantan River. Owing to its geographical location and age, the bridge was identified to have a number of defects which required urgent attention. This paper describes the assessment programme which was implemented prior to the rehabilitation, to identify the nature, extent and severity of different defects which are commonly found in reinforced concrete structures located in tropical environments. The principal features of the rehabilitation scheme were crack repairs, formwork grouting, composite strengthening and protective coating.

The paper will also discuss in length the overall sequence of the rehabilitation programmed, temporary works, site constraints faced during the monsoon period, including safety and traffic management, which were vital for the successful and timely completion of the rehabilitation scheme.

HIGH VOLUME FLY ASH UTILIZATION IN HIGH-FLOWABLE SELF-COMPACTING CONCRETE

NATHANIEL B. DIOLA
University of the Philippines
Diliman, Quezon City, Philippines
nathaniel.diola@up.edu.ph
Nobuaki OTSUKI
Tokyo Institute of Technology
Meguro-ku, Tokyo, Japan

Abstract:

With the aim of developing high-flowable self-compacting concrete (HFSCC), this study was conducted to ascertain the feasibility of using locally available fly ash as an ingredient in HFSCC mixes. The recommendations by the JSCE on proportioning powder-type high-flowable concrete were followed.

The fly ash content, optimum superplasticizer dosage, and temperature effects were among the factors considered in the study. Results show that HFSCC can be achieved using locally available fly ash. The fly ash content to be used will be dictated by the target strength and other design considerations. Also, it was shown that increasing the temperature is beneficial in relation to the compressive strength of HFSCC.

STEEL FIBRES AND MESH – JUST HOW DO THEY COMPARE

R RATCLIFFE
Technical Manager
BOSFA(Bekaert OneSteel Fibres Australasia)
Perth, Western Australia
E-mail: Royce@bosfa.com

Abstract:

Most engineers and builders accept that steel fibres provide some level of reinforcement for concrete and that the possibility exists to substitute fibre reinforcement for mesh. The problem that often arises, however, is how to simply and quickly determine the fibre dosage required to provide the same load

carrying capacity as a mesh reinforced section and how a fibre reinforced element will subsequently perform in comparison. This paper addresses what are fundamental questions for designers and users of fibre reinforcement based on a design guideline (INFRASTRUCTUUR IN HET LEEFMILIEU Nr 4-1995) written for inclusion in Eurocode 2: Design of concrete structures and published by the Ministry of the Flemish Community, Department of Infrastructure & Environment, Belgium.

OUTLINES OF DAMAGE EVALUATION, SEISMIC CAPACITY EVALUATION, AND RETROFIT TECHNIQUES OF R/C BUILDING IN JAPAN

K. KITAJIMA
Building Technology Development Division,
Research and Development Institute, Aoki Corporation, Ibaràki, Japan
E-mail: keijima@aoki.co.jp

M. NAKANISHI and H. ADACHI
Department of Oceanic Architecture Engineering
College of Science and Technology, Nihon University, Tokyo, Japan

Abstract:

Buildings damage by earthquakes in Japan are typically evaluated based on the damage evaluation standards. Existing buildings unaffected by earthquake are evaluated based on the seismic capacity evaluation to decide whether seismic retrofit is needed. The present paper outlines the damage evaluation and the seismic capacity evaluation systems generally used in Japan to evaluate reinforced concrete (R/C) buildings. Also, seismic retrofit techniques applied to buildings are reviewed and the response-control retrofit method using friction dampers developed by the authors are outlined.

CHARACTERISTICS OF LONG PERIOD OSCILLATIONS IN A HARBOR BASED ON FIELD MEASUREMENTS

ERIC C. CRUZ
Department of Civil Engineering
University of the Philippines, Quezon City, Philippines
eric.cruz@up.edu.ph

Abstract:

The fundamental characteristics of long period oscillations are investigated based on field measurements around an existing harbor. Time series data of water surface displacements were analyzed to obtain these oscillations, determine their frequency spectra and synthesize their significant wave statistics. The results show that their magnitudes increase in shoaling depths and reach the same order of magnitude as the sea waves inside the harbor. The frequency spectra also suggest that energy is transferred from the sea waves to these oscillations, which enables the long period spectral components to retain a significant proportion of the incident energy inside the harbor.

STRUCTURAL ENGINEERING

HIGH STRENGTH CONCRETE MODELING BY ARTIFICIAL NEURAL NETWORKS

FLORES, ARTURO JR., NG, TIFFANY,
ROXAS, CARLO
Senior students
De La Salle University-Manila
E-mail: tifflng@yahoo.com

Abstract:

The objective of this study is to develop a computing device that may provide an accurate strength prediction of High Strength Concrete (HSC). Artificial Neural Networks (ANN) of the back propagation type was used to map the strength of High Strength Concrete given the design mix. Several ANN models were trained and simulated using 89 sets of data composed of the amount of cement, water, admixture, slag, silica fume, RHA (Rice Hull Ash), fine aggregates, coarse aggregates, fly ash and metakaolin, and the corresponding compressive strength of concrete at 28 days. These ANN models were then tested by evaluating the errors computed from the training and testing predictions, the fit of the ANN model, and parametric studies on the behavior of HSC. An acceptable model was then chosen to represent the performance of High Strength Concrete. Past studies on the behavior of HSC were discussed to validate and compare with the results from the ANN models. The results show that ANN can be used to trace the behavior of HSC and predict its strength. Studies on HSC are numerous, but a synergy of all related information is needed in order to provide more authoritative and complete references for further studies on HSC.

IDENTIFICATION OF DYNAMIC MODEL OF RC BUILDING

ABUDULA, H. SHIOJIRI and Y. KOBAYASHI
Department of Civil Engineering
College of Science and Technology, Nihon University, Tokyo, Japan

Abstract:

Building in Funabashi campus of Nihon University are being retrofitted one by one. Vibration tests and micro-tremor measurements were conducted on the buildings before and after retrofitting. The result of the tests and the measurements are described. At first several data processing method for the identification of dynamic characteristics of structures, such as FFT, AR, ERA method, and, ARMA method, are examined using the result of numerical simulations. Then, the methods are applied to the test results and micro-tremor

measurements. The reliability of mode parameters obtained from micro-tremor measurements are evaluated by comparing with those vibration tests. The effects of retrofitting are demonstrated from the differences of vibration characteristics of buildings.

REPORT DAMAGE INVESTIGATION IN TAIWAN AFTER THE CHI-CHI EARTQUAKE

THE CHI-CHI EARTHQUAKE DAMAGE INVESTIGATION TEAM
College of Science and Technology,
Nihon University

K. HANADA, H. SHIOJIRI, T. KAMAI, J. SUZUMURA, M. NAKAMURA
Department of Civil Engineering

M. YAMADA, K. MORIIZUMI
Department of Architecture

H. ADACHI, M. NAKANISHI
Department of Oceanic Architecture and Engineering

Abstract:

The magnitude-7.3 Chi-Chi earthquake with a focal depth of about 7 km struck central Taiwan on September 21, 1999 to great damage over a wide range including urban areas. It was a remarkable feature of the earthquake that a gap several meters was created on the surface over distances of about 80 km. Over 2,200 peoples were killed due to building collapse resulting from the severe ground shaking. This paper is the report of ground deformation and damage investigation of infrastructure and buildings.

LOAD EFFECT FOR HABITABILITY STATE OF OCEANIC ARCHITECTURAL BUILDINGS AND THE LIMIT EVALUATION OF HABITABILITY BY VERTICAL MOTION

SAITO YASUTAKA AND SAIJO OSAMU
Graduate School of Science & Technology Nihon University,
Oceanic Architecture and Engineering
E-mail: yasu@post.ocean.cst.nihon-u.ac.jp
E-mail: saijo@ocean.cst.nihon-u.ac.jp

Abstract:

In the structural design of oceanic architectural buildings with living space, uncomfortable motions caused by oscillation or vibration in vertical and horizontal direction have to be considered. This problem can't be avoided in viewpoint of the evaluation of habitability and workability in limit state design, whether human can adjust or not to that surrounding in the daily life level.

The object of this paper is to study focusing on the habitability limit state by vertical motion problem of the oceanic architectural buildings on establishment of calculation method of 1-year expected value in return period based on average of significant wave at daily intervals. Furthermore, we calculated acceleration response of floating structural model by significant wave in Tokyo Bay, and plotted those results into the obtained figure in order to examine the validity of evaluation by three comfortable states that living level, office work level and work level in the evaluation of habitability.

DESIGN WAVE LOAD ACTING ON FLOATING ARTIFICIAL BASE BY DIFFRACTION THEORY

ETO HIROAKI
The Institute of Physical and Chemical Research, Integrated V-CAD System Research Program, V-CAD High Speed Computer System Team
E-mail: hiro@atlas.riken.go.jp
Co-author: SAIJO Osamu (Professor)
Affiliation: Department of Oceanic Architecture and Engineering, College of Science and Technology, Nihon University
E-mail: saijo@ocean.cst.nihon-u.ac.jp

Abstract:

In Japan consisting of small land, and in the past, development of the land has been constructed by reclamation from coastal zone, and mainly the reclaimed land had used for industrial facilities. Nowadays, there is the difficulty to get coastal zone for development and the subject relating to preservation of ocean environment remains. Therefore, for effective utilization of ocean space it is considered that floating and artificial island is effective, and its construction by the introduction of floating structural system has been expected. Comparing floating structure with reclaimed land, it is very profitable in terms of cost and environment. We are aiming to construct buildings on a large floating structural system on the sea. This structural system, so called as floating artificial base, has large possibility for application to floating airport, IT industrial base, protection facility against earthquake disaster, leisure facility, etc.

Floating artificial base is constructed in the place where environmental loads as well as wave and wind, act on. Therefore, investigation of distribution characteristic of environmental load acting on the base for safe structural design is very important. We treat wave loads in this paper. Because special knowledge of fluid dynamics is necessary for structural design of oceanic structure, wave force analysis is too difficult for structural designers who don't have its knowledge even though they have many experiences and excellent skills. Therefore we are aiming to propose a practical estimation method regarding wave force analysis acting on floating artificial base. Concretely, characteristics of wave load distribution were grasped by systematic numerical calculation by boundary integral equation method. We arranged those wave loads in non-dimensional expression with wave period, scale of structure so as to correspond arbitrary combination of them, and showed graphs of wave load relating to every element of base bottom. We could furnish the design materials that enabled to estimate wave load acting on the structure.

Even though the structural designer lacks that knowledge, they can easily obtain wave load acting on floating artificial base.

In this paper, non-dimensional wave load acting on floating artificial base will be shown by graphs through the examination of distribution property of wave load in the varying profile of wave, draft, depth of the water, and aspect ratio. We have shown the directions for use of these design materials. And we have inspected the validity as design materials by comparing published data in order to check the error of this practical estimation method.

FLEXURAL BEHAVIOR OF PRECAST BLOCK BEAMS USING EXTERNAL PRESTRESSING METHOD

Y. YAGINUMA AND J. SAITO
Department of Transportation Engineering & Socio-Technology
College of Science and Technology, Nihon University, China, Japan
E-mail: yaginuma@trpt.cst.nihon-u.ac.jp

Abstract:

Flexural tests for precast block beams using the external or internal prestressing methods were carried out in this paper. Effects of prestressing methods and block lengths on the flexural capacity and the deflection behavior of block beams are investigated. The flexural capacity of the block beams is calculated by the proposed analytical method for the block beams using the external or internal prestressing methods. The analytical method is took account of the change of the eccentricity of external cables, the localization of the concrete strain at the extreme compression fiber of the block. The calculated results of the flexural capacity agree well with the tested results.

RESPONSE ANALYSIS OF FLOATING ARTIFICIAL BASE-BUILDING OF FRAMED STRUCTURAL MODEL BY WAVE FORCES

O. SAIJO, Y.SAITO, K. KAMEKAWA
Department of Oceanic Architecture and Engineering
College of Science and Technology, Nihon University, Chiba, Japan
E-mail: saijo@ocean.cst.nihon-u.ac.jp

Y. MASUMO
Daito Trust Construction Co., Ltd. Tokyo, Japan

H. ETO
The Institute of Physical and Chemical Research, Saitama, Japan

Abstract:

Aiming to expand living space to the ocean where human beings will maintain their life and work, we have started the research and development (R & D) concerning the construction of a floating artificial base and architectural building on it. The purpose of this paper is pursuing the dynamic response analysis of the floating artificial base and building by diffraction wave forces associated with fluid-structure interaction. We had selected the small-sized and medium-sized floating structures except very large floating structure like Mega Float [VLFS, 1999] and Mobil Offshore Base, because it was considered which selected structured had actual possibility of construction. Assuming that the floating base and the building were united so as to be one body, we have aimed to elucidate the dynamic characteristics of deformation, force and moment of that structure. And using the result, we tried to evaluation of the habitability has been discussed.

CHART OF NATURAL FREQUENCY OF ELASTIC PLATE

K. MARUYOSHI
Department of Oceanic Architecture and Engineering
College of Science and Technology, Nihon University, China, Japan
E-mail: k-maru@post.ocean.cst.nihon-u.ac.jp

H. ETO
THE institute of Physical and Chemical Research, Saitama, Japan

O. SAIJO
Department of Oceanic Architecture and Engineering
College of Science and Technology, Nihon University, Chiba, Japan

Abstract:

At present, the vibration problems of building, especially, concerning plate structural system, have been reported frequency, and if we pay attention, we can feel easily those phenomena around us. Since ancient times, this plate structure has been used to the wall, floor board roof, etc. The purpose of this paper is to offer a chart expressed by dimensionless natural frequencies of elastic plate structure. In case of use of this system as principal structural part of buildings or structural member, present chart aims to enable decision of the sizes so as to avoid resonance in the early stage of planning and design of building. The chart was given by systematic calculation results by computational program of FEM. The validity and accuracy of its program was verified by comparison with published data and modal experiment.

MOTION ANALYSIS OF FLOATING STRUCTURE BY WAVE LOADS BASED ON RIGID AND ELASTIC BODY ASSUMPTIONS

KAMEKAWA KAZUO, ETO HIROAKI
AND SAIJO OSAMU
Graduate School of Science & Technology Nihon University,
Department of Oceanic Architecture and Engineering

The Institute of Physical and Chemical Research, Integrated V-CAD System Research Program, V-CAD High Speed Computer System Team
E-mail: hiro@atlas.riken.go.jp
E-mail: saijo@ocean.cst.nihon-u.ac.jp

Abstract:

Floating structures have many options for effective ocean space utilization, for example, the so called Mega Float is famous with construction project of floating airport in Japan, which structure is made by very large scale. Aside from such a kind of structure, there is a high possibility to construct small-sized or medium-sized floating structure, and those scale structure can be seen in various places.

Aiming to expand our living space to the ocean so as to live comfortably or work there, we are continuing to elucidate the dynamic behavior in structural engineering. In that view and in the structural vibration mechanics, the motion of large sized structure is known well to be controlled by elastic vibration through the technical report of Mega Float. As the size of structure becomes smaller, it can be predicted that oscillation caused by rigid-body motion will appear.

A STUDY ON DYNAMIC CHARACTERISTICS OF MOCK-UP PILE FOUNDATION MODELS PART 1 AN OUTLINE OF FORCED VIBRATION TEST

Y. SHIMOMURA
Department of Construction
Junior College of Nihon University, Chiba, Japan
shimo@arch.jcn.nihon-u.ac.jp

H. ADACHI, M. NAKANISHI AND Y. OGUSHI
Department of Oceanic Architecture and Engineering
College of Science and Technology, Nihon University, Chiba, Japan

M. NAKAMURA
Department of Civil Engineering
College of Science and Technology, Nihon University, Tokyo, Japan

T. ARAI
Technical Research Institute
Nishimatsu Construction Co. Ltd., Kanagawa, Japan

Abstract:

We had conducted twice forced vibration tests of five mock-up pile foundations at Funabishi Campus in Chiba Prefecture in 1995 and 1996. After six years, we repeated forced vibration test of the same models. The forced vibration test was carried out to confirm the secular variation of the dynamic characteristics of the pile foundations and to obtain essential features of the dynamic cross interaction among the adjacent foundations. In this paper, we introduce an outline of the forced vibration test and describe the results of the comparative analysis study with the experiment.

A STUDY ON DYNAMIC CHARACTERISTIC OF MOCK-UP PILE FOUNDATION MODELS PART 2 DYNAMIC FEATURES OF ADJACENT FOUNDATIONS

Y. IKEDA
Nuclear Facilities Department
Taisei Corporation, Tokyo, Japan

Y. SHIMOMURA
Department of Construction
Junior College of Nihon University, Chiba, Japan
shimo@arch.jcn.nihon-u.ac.jp

H. ADACHI, M. NAKANISHI AND Y. OGUSHI
Department of Oceanic Architecture and Engineering
College of Science and Technology, Nihon University, Chiba, Japan

R. KONDO
Tokyo Soil Research, Tokyo, Japan

Abstract:

Forced vibration tests of five mock-up pile foundations were conducted to confirm secular variations of the dynamic characteristics of soil surrounding foundation models and to obtain essential feature of the dynamic cross interaction among adjacent foundations. This paper first gives a detailed description of the test results and presents a simulation analysis of response of the excited foundation as a single foundation to decide the soil profile. Coupled soil impedance functions are also identified by responses of the excited foundation model. Then, the experiment results of multiple different foundation models that are simulated by using the flexible volume method are introduced. The method utilized in the simulation analysis employs the harmonic point solutions derived by the thin layer formulation, which especially prepared for executing analyses of plural foundation models.

CONSTRUCTION MATERIALS AND METHODS

DEVELOPMENT OFUTILIZATION TECHNOLOGIES FOR MT. PINATUBO EJECTS AS PRIME MATERIALS FOR CONCETE (PART 1-CONCRETE MATERIALS STRUCTURE-PROPERTY CHARACTERIZATION)

G. SHIMIZU
Department of Architecture
College of Science and Technology, Nihon University, Tokyo, Japan

BAARDE, R.O. and JORILLO, P.A. JR.
Civil Engineering Department, Integrated Research and Training Center
Technological University of the Philippines

Ayala Blvd., Ermita, Manila

ADACHI H., NAKANISHI M. and Y. TSUBOYAMA
Department of Oceanic Architecture and Engineering
College of Science and Technology, Nihon University, Chiba, Japan

Abstract:

A total of 11 billion cubic meters of volcanic materials was ejected by the Mt. Pinatubo after its 13 major blasts from 1991 to 1994. This is considered as one of the most devastating disaster of the decade. The deposits are predominantly pumiceous of andesite scoria, with phenocryst-rich and phenocryst0poor dacite pumice fragments. Due to large volume of volcanic debris, government and private institutions are looking for ways to utilize and maximize the economic potential of these materials. A medium term R & D Program was developed in order to come-up with utilization technologies of Pinatubo ejecta for the construction sector, and that will tackle basic question of raw materials sourcing, optimization, design and test of product and tests of product for specific applications, validation, and transfer of technology to adoptee. The Technological University of the Philippines in cooperation with Nihon University, Japan's Ministry of Education, and Philippine's Department of Science and Technology launched an R & D program on utilization of Mt. Pinatubo ejecta materials for construction. This paper describes the significant results of extensive studies conducted by the authors in 1919-up to present in the following areas:

1. Structure Property characterization of ejecta materials
2. Application as prime materials replacement for cement for durability improvement
3. Application or lightweight concrete and mix designs proportions

DEVELOPMENT OF PRECAST R/C HOUSE CONSTRUCTION UTILIZING THE MT. PINATUBO EJECTA (PART 2 ARCHITECTURAL AND STRUCTURAL DESIGN CONCEPT)

H. ADACHI, Y. TSUBOYAMA AND M. NAKANISHI
Department of Oceanic Architecture and Engineering
College of Science and Technology, Nihon University, Chiba, Japan

G. SHIMIZU
Department of Architecture
College of Science and Technology, Nihon University, Tokyo, Japan

B. A. LEJANO, R. O. BAARDE AND R. R. IRABON
Technological University of Philippines
Integrated Research and Training Center, Manila, Philippines

Abstract:

This study is aimed at development a new concrete material using Mt. Pinatubo ejecta as aggregate and then designing and planning a prefabricated house by using the material in the main structures. The fabricated housing system developed in the present study is a self-build system using lightweight panels, the architectural and structural design concept are first presented and then prefabricated houses based on unit spaces (cell) are described.

DEVELOPMENT OF PRECAST R/C HOUSE CONSTRUCTION UTILIZING THE MT. PINATUBO EJECTA (PART 3 PERFORMANCE TEST OF FULL-SCALE STRUCTURE)

H. ADACHI, Y. TSUBOYAMA AND M. NAKANISHI
Department of Oceanic Architecture and Engineering
College of Science and Technology, Nihon University, Chiba, Japan

G. SHIMIZU
Department of Architecture
College of Science and Technology, Nihon University, Tokyo, Japan

R. INABA
Japan E.R. Co. LTD

T. AOYAGI
Graduate Student, Department of Oceanic Architecture and Engineering
College of Science and Technology, Nihon University, Chiba, Japan

B. A. LEJANO, R. O. BAARDE
Technological University of Philippines
Integrated Research and Training Center, Manila, Philippines

Abstract:

In this paper the test results of the full-scale framed assembled column, beam and slab members are reported. The tests are carried out to investigate the structural performance of a full-scale framed structure assembled each members. Furthermore, this test is aimed at investigating the feasibility of construction work. From the test results, the feasibility of work and the strength and deformability of entirely structure are confirmed.

CONSTRUCTION METHOD OF HOUSING ON WATER IN PUERTO PRINCESA CITY, PHILIPPINES

DIONISIO A. ESPRESSION, JR.
Technological University of the Philippines

SAIJO OSAMU, IKEDA HIROAKI, KUROYANAGI AKIO AND TAKEZAWA MISTUO
Department of Oceanic Architecture and Engineering, College of Science and Technology, Nihon University
E-mail: saijo@ocean.cst.nihon-u.ac.jp

Abstract:

This paper is a report on an investigation concerning construction method of houses built on the sea in Palawan Island. The investigation had been conducted in the research frame entitled "preparatory studies of infrastructure in symbiosis with ocean environment of Malay Sphere". This is a joint research between TUP and Nihon University, and Puerto Princesa City authority had offered full support for field trip.

This research stands on ocean axis and international viewpoint. The region of the Malay sphere for investigation is blessed with marine resources, and people living there maintain extremely simple life style in symbiosis with ocean.

The purpose of this field trip was to investigate the scale of houses built on the shore, construction method, materials, devices or various ideas to make life style comfortable, etc., in the view of architectural planning and engineering, and aims to grasp indigenous living space of people living on the ocean.

Puerto Princesa City, Palawan Island in Republic of the Philippines is located at central part of Palawan Island between South China Sea and Sulu Sea, and the area of 2,531,982 ha. Sulu sea side is dotted with lots of islets.We will report the following contents information of Village, peculiarity of houses nearby seashore classification by housing materials module and expenses for construction the actual situation of houses on the sea in Puerto Princesa hearing of Natural Disaster and summary.

STRUCTURAL AND ECONOMIC COMPARISON BETWEEN THE CONVENTIONAL AND STACKING METHOD OF LAYING LOCALLY MANUFACTURED NON-LOAD BEARING CONCRETE HOLLOW BLOCKS (CHBs) IN ILOCOS SUR

ENGR. NORMA A. ESGUERRA
ENGR. MARIO Y. GUZMAN

Abstract:

One structural element in constructing a building which requires lengthy execution is the construction of peripheral walls and partitions. If the duration of this activity is lessened, the total construction time will surely be shortened, and somehow, a cut in the construction expense due to the subsequently saved time shall also be realized.

This study presents an analysis of the effects of deviating from the conventional way of laying concrete hollow blocks with the proposed stacking method using locally manufactured concrete hollow blocks.

The general trend of the study suggests that the proposed stacking method of laying locally manufactured concrete hollow blocks could save time at an average of 39 seconds per square meter on the first meter height of wall. Timesavings accumulate more as the wall progresses in height. Using this statistics, a medium rise building with 1,500 sq.m. Of wall area could save two man-days with the method.

The test results show that the samples laid using the stacking method are generally stronger than the samples done with the staggered method in terms of the recorded higher compressive stresses. Studies like these would promote the development of the countryside construction industry.

STEEL FIBER REINFORCED CONCRETE USED IN THE CONSTRUCTION OF FLOOR SLAB FOR SM WAREHOUSE IN PARANAQUE PHILIPPINES

Fred How
BOSFA Dramix Fibre Steel
BOSFA Singapore

JEDEL G. AGRON
Integrated Research and Training Center
Technological University of the Philippines
Manila, Philippines

PHILIP LIM
LKS Construction & Development Corporation
Manila Philippines

Abstract:

The addition of steel fiber into the concrete results in a composite material that is enhanced in its mechanical properties such as compressive strength, flexural toughness, impact resistance, fatigue resistance, shear strength, durability and crack control ability. The post crack ductility toughness is an important characteristic of steel fiber reinforced concrete, which is also defined as toughness. This important behavior of steel fiber reinforced concrete facilitates stress redistribution to occur in the concrete floor slab thus enable much larger load carrying capacity as compare to the plain concrete. The aforementioned advantages of using steel fiber reinforced concrete make it a popular option in the construction of floors on ground.

INFLUENCE OF SLAG AND FLY ASH ON THE HARDENED PROPERTIES OF CEMENT – LAHAR SAND CONCRETE PAVING BLOCK

JEDEL G. AGRON
Department of Civil Engineering
Integrated Research and Training Center
Technological University of the Philippines
Ermita Manila, Philippines

Abstract:

This paper presents the experimental investigation of concrete paving block made of lahar sand < 9.52 mm in size and crushed furnace slag aggregates < 9.52 mm in size with fly ash as cement replacement. The properties investigated were compressive strength and abrasion resistance under natural weathering. The effects of fly ash were also investigated. Two

mixture proportions were investigated Series A consisted of mixes having varying content of crushed slag as replacement of lahar aggregates, ranging from 30,40,50 and 60 percent (%) by weight. Series B contained mixes with a varying water cement ratio ranging from .45, .50, and .55, respectively. The experiments were conducted using the appropriate ASTM standards.

The results indicate that for concrete paving block with constant water cement ratio incorporating crushed slag aggregates there is a significant increase of the compressive strength of block. Data indicate a definite beneficial effect of crushed slag on the hardened properties of concrete block. Further, the surface of concrete block becomes rougher as the crushed slag content increases. Incorporating fly ash on the block as cement replacement is not really beneficial on the strength of the block. The results indicates that for concrete block with constant water cement ratio incorporating fly ash as cement replacement there is a significant decrease of the compressive strength of block. The abrasion resistance of block was affected similarly.

UTILIZATION OF MINE TAILING FROM COPPER-GOLD MINING PROCESS AS FINE AGGREGATES OF ROLLER COMPACTED CONCRETE

GOPEZ, RENATO G.
Bulacan state University, Malolos, Bulacan, Philippines
E-mail: renezepog@yahoo.com

Abstract:

This paper presents the study on the mine tailings as an alternative or substitute construction material. It is focused on the feasibility of using mine tailings as fine aggregates instead of sand in a roller compacted concrete (RCC). The mine tailings used were obtained from Tailings Dam #2 of Philex Mining Corp. in Padcal, Tuba, Benguet. These tailings consist of finely ground siliceous particles processed by series of crushing, sizing, grinding, and concentrating or to extract cooper and gold. A comprehensive experimental program was conducted to investigate the strength, and durability of roller compacted concrete with Philex mine tailings as fine aggregates. It was then compared with lahar aggregate concrete and RCC with Porac sand. Various mixtures of RCC with low, medium, and high cement contents were and cast. The strength at 28 days of RCC containing mine tailings and sand ranged from 17 to 28 Mpa and 17 to 37 Mpa, respectively, at dry density of 2350 to 2450 kg/cum. The duarability of RCC with mine tailings was evaluated by subjecting the specimens to an alternate wetting and drying cycles. The remaining strength of 18.7 MPa after 15 cycles indicates that it could endure stresses due to weather changes in the Philippines. Based on the result of various test conducted, it shows that Philex mine tailings has the potential to be a substitute of sand or an alternative fine aggregates in a roller compacted concrete.

INITIAL INVESTIGATION ON USING MT. PINATUBO LAHAR COARSE AGGREGATES WITH HIGH VOLUME OF FLYASH FOR SELF-COMPACTING CONCRETE

D. PAGBILAO
Integrated Research and Training Center, Technological University of the Philippines
E-mail: dspagbilao@quickweb.com.ph

N. MATSUNAGA, T. KAWAGUCHI, J. NIWA
Department of Civil Engineering, Tokyo Institute of Technology
E-mail: jniwa@cv.titech.ac.jp

Abstract:

Coarse aggregates with size ranging from 4.75-19.0 mm taken from the volcanic ejecta of Mt. Pinatubo was investigated as aggregate for self compacting concrete. The volume of coarse aggregate in the concrete was fixed at 119-211 li/cu.m. A high volume of flyash ranging from 300 to 340 kg/cu.m was used in the mix to observe its contribution to viscosity and as a partial cement replacement. The effect of varying the Vw/Vp and composition of the coarse aggregate to the fresh and hardened properties of self-compacting concrete was investigated. For evaluating the fresh properties, the slump flow test, V-funnel test and U-flow test were employed. For evaluating the hardened properties, the compressive strength, elastic modulus, split-tensile strength, and crack load were determined.

It was observed from the test results that with the use of superplasticizer, any mix proportion can be rendered with sufficient slump flow required for SCC. However, sufficient slump flow does not guarantee sufficient stability (V-Funnel flow test). Test results indicated that a Vw/Vp of at least 90% is necessary for sufficient stability. From the evaluation of the ability of the concrete mix to pass through obstacles by the U-flow test, it was observed that concrete mixes with combined aggregate grading approximating the Fuller maximum density grading curve has better ability to pass through obstacles compared to concrete mixes with single size aggregates. From the compressive strength test results, it is indicated that a certain amount of flyash complements Portland cement as binder. The results also indicated that the use of smaller coarse aggregates yields higher concrete compressive strength, while the use of single size of larger aggregates yields lower concrete modulus of elasticity. With proper proportion, sufficient concrete compressive strength may be attained with Mt. Pinatubo coarse aggregates SCC. From the split tension and compact tension tests, results indicate that lower W/C and higher cementitious material content in the mix yields higher tensile and cracking strengths.

MECHANICAL BEHAVIOR OF IMPROVED SUPER LIGHTWEIGHT CONCRETE BEAMS BY PRESTRESSING

Y. YAGINUMA
Department of Transportation & Socio-Technology

College of science and Technology, Nihon University, Tokyo, Japan
E-mail: yaginuma2trpe.cst.nihon-u.ac.jp

T. UMEMURA
Department of Civil Engineering
College of science and Technology, Nihon University, Tokyo, Japan

Abstract:

Tensile strength of super lightweight concrete is remarkably smaller that that of normal weight concrete. Structural members using super lightweight concrete need to be improved by some method. This study investigated the effect of prestressing on the mechanical behavior of super lightweight concrete beams. The shear capacity of super lightweight concrete beams increases, as the prestress force increases. It is clear that the mechanical behavior of super lightweight concrete beams is improved by the effects of prestressing. Moreover, effects of the amount of fiber and/or prestressing on the shear capacity of lightweight concrete beams are investigated in this paper.

CHARACTERIZATION OF THE PROPERTIES OF BATANGAS COAL-FIRED THERMAL POWER PLANTS (BCFTPP'S) BOTTOM ASH STABILIZED WITH CEMENT

BAARDE, REYNALDO O., * GABRIEL ROMEL R., GARCIA, GERARDO N., LARA, SHERWIN S., MALACAD, RHODORA L., SAMALA, JOHN EDWIN Z., SAPIDA CARLITO R. **
Civil Engineering Department, Integrated Research and Training Center, Technological University of the Philippines, Ayala Boulevard, Ermita, Manila
E-mail address: arebee@quickweb.com.ph

Abstract:

The study deals with the experimental analysis of various physical and mechanical properties of Batangas Coal-Fired Thermal Power Plant's (BCFTPP's) Bottom Ash and cement-stabilized BCFTPP's bottom ash. This research project intends to establish a comprehensive database that may serve as baseline information for further research and will determine the suitability of this stabilized and non-stabilized bottom ash as a construction material.

Some physical properties, such as grain size, specific gravity, unit weight and absorption of BCFTPP's bottom ash were determined. Various mechanical properties of stabilized and non-stabilized BCFTPP's bottom ash were analyzed using Standard Proctor Compaction Test, California Bearing Ratio Test, Permeability Test, Unconfined Compressive Strength Test and Abrasion Resistance Test.

The findings showed that the BCFTPP's bottom ash exhibits a relatively low specific gravity and high absorption, which differs from any other soil material. The cement-stabilized BCFTPP's bottom ash was noted for its good bearing capacity and for being impermeable, but a little poor against unconfined compressive strength and abrasion. Considering the result of this study, the cement-stabilized BCFTPP's bottom ash can be utilized as subbase, base course, dam shell or for pervious backfill.

INFLUENCE OF PHILIPPINES GROUND FURNACE SLAG UPON THE FRESH AND MECHANICAL PROPERTIES OF CONCRETE

JEDEL G. AGRON
Department of Civil Engineering
Integrated Research and Training Center
Technological University of the Philippines
Ermita Manila, Philippines

Abstract:

The effect of ground slag on the performance of fresh and hardened properties of concrete was investigated. A test was conducted in two series of concrete mixtures. Series A consisted of mixes having varying content of ground slag as replacement of cement ranging at 20-60% by weight. Series B contained mixes with varying water cement ratio ranging .45, .50 and .55% respectively.

The results indicate that concrete with constant water cement ratio incorporating ground slag as cement replacement resulted in to significant benefits both for the slump and air content. The data show a definite beneficial effect of ground slag on the fresh properties of concrete. Furthermore the compressive strength of concrete decreases linearly with the increase of ground slag content. The flexural and tensile strength are affected similarly.

CONTROLLED CRACK PROPAGATION IN CONCRETE COMPOSITE STRUCTURES

GEORGE WATERHOUSE,
Hilti Asia Limited, Singapore
FRITZ MUENGER,
Hilti Corp., FL-9494 Schaan, Principality of Liechtenstein

JUNEL CACAL, and PABLO JORILLO JR.,
Hilti (Philippines), Inc. 2326 Pasong Tamo Extension, Makati City

Abstract:

For the design of concrete composite structures, the transfer of internal stresses across the bond interface between new and old concrete is a critical aspect. The structural characteristics of the resulting composite structure should be equal to those of the corresponding monolithic structure and the serviceability limit states must comply with the customer's requirements. Differential shrinkage and cyclic temperature changes are the primary causes for possible delaminations of the new concrete at the perimeter of the composite structure. Reinforcement transverse to the interface acts as effective crack propagation control. Tests have been performed and evaluated to study crack behavior by means of the fracture mechanical properties of plain and reinforced concrete

composite bond interfaces. The effect on ultimate limit states and serviceability limit states are discussed. Post-installed chemical anchoring technology for the transverse reinforcement has been considered and strategies are shown for improved behavior of old-to-new concrete bonds. They lead to an optimisation of the quality of such bonds as well as its transverse anchor reinforcement.

TRANSPORTATION ENGINEERING

A BASIC STUDY ON THE RELATION BETWEEN EVOLUTION OF TRANSPORTATION AND URBAN DEVELOPMENT IN BANGKOK

K. AMANO
College of Science and Technology, Nihon University, Chiba, Japan

M. TSUCHIYA
Graduate Student
College of Science and Technology, Nihon University, Chiba, Japan

A. KISHIUE
Graduate Student
School of Urban and Regional Planning, University of the Philippines, Diliman, Philippine

Abstract:

Bangkok, a capital city of Thailand, was established when Chakri Dynasty was founded by Rama I in 1782. Since its established, Bangkok has developed and formed as one of the major cities in South East Asia. This paper aims to comprehend the evolution, growth pattern, and characteristics of Bangkok since its origin through the development of infrastructure, mainly transportation system in the area, as well as influence on the city structure. The study was conducted based on the second data gathering through library research and interview. As the result, we found that the establishment of each district and growth pattern of Bangkok have strong relation with the development of the infrastructure, especially main transportation mode. Therefore, we concludes as follows: although it seems that Bangkok has been formed as the result of urban sprawl through the infrastructure development, this paper enables us to consider that Bangkok was formed through the development of infrastructure which had the vision of leading the growth of the city.

EVALUATION OF URBAN ROAD CARBON MONOXIDE (CO) DISPERSION

ENGR. MANUEL M. MUHI
CE Department-Head
Civil Engineering Department
Polytechnic University of the Philippines
NDC Compound, Sta. Mesa, Manila
Fax: 713-60-09
Tel. No. 716-62-73
Email: mmuhi@eudoramail.com

Abstract:

The urban air pollution is one of the problems presently encountered by a fast growing metropolis worldwide. The road traffic in urban areas is the primary source of some categories of pollutants that adversely affect the quality of air. Traffic emission, in large city centers, contributes dominantly to the level of the lead (Pb), Carbon Monoxide (CO), Oxides of Nitrogen, HC or volatile organic compounds and other particulate. These vehicle emissions can damage health especially those of pedestrians and persons living or working in open near traffic areas. Reduction and mitigation of urban air pollution due to public utility vehicle emission is one of the problems of the government over the past decade.

THE IMPACT OF TRAFFIC OUNTERMEASURE AT A BUS STOP OF EPIFANIO DE LOS SANTOS AVENUE (EDSA), METRO MANILA

MARIKO OZAKI, ATSUSHI FUKUDA
Dept. of Transportation Engineering
College of Science & Technology., Nihon University
Chiba, Japan

MASAYUKI ISHIYA
Intel-tech Institute Co., Ltd. Department of Civil Engineering,
Tokyo Japan

ALEXIS FILLONE
De La Salle University, Manila, Philippines

Abstract:

This paper presents the effect of a traffic countermeasure done at a bus stop of EDSA. Bus behavior frequently causes traffic congestion in Metro Manila, especially along bus stops. To comprehend the relationship between the action of the bus and traffic congestion, the group performed on the spot investigation along a bus stop where color cones are placed to separate the bus and other vehicles. As the results of this survey showed there was a change in the traffic flow rate, while clarifications were also discussed regarding the wrong placement of color cones.

THE STUDY ON AIR TRANSPORT IN EAST ASIA

HIROTO SASAKI
Undergraduate Students at Department of Transportation Engineering and Socio-Technology
College of Science and Technology, Nihon University, Tokyo, Japan

HARUYUKI NAKAYAMA
Department of Transportation Engineering & Socio-Technology
College of Science and Technology, Nihon University,

Abstract:

This paper describes the study on East Asian airlines circumstances and strategy to survive severe competition in the world. To investigate the circumstances, various data about airlines have been collected. East Asian Countries should cooperate further in air transport field in order to develop strong airlines that can compete with US and EU. East Asia airlines are too small in terms of network size, traffic volume, and operating revenue to compete with them. The deregulation that US domestic market since late 1970s and intra-EU market in 1988 have been encouraged improving efficiency and making mega-carriers that have strong competitiveness. The major industrial trend "Globalization and Internationalization" forced airlines to expand a global network. The US and EU major airlines have strong interest in Asia market and try to raise their share by connecting between their home base to Asia cities and even intra-Asia air route.

East Asia countries need to change the current regulatory regime. One reason for this is the growth of East Asia airlines is limited by restrictive bilateral agreements between Asia countries. In the global airlines industry, size is an important efficiency and competitive factor, for Asian airlines, it is difficult to compete with the Western carriers.

It seems that the higher growth rate than the West since 1980s brought Asia to one of the most important market in the world. However, many countries are still in the development stage, and its stage in each country is very different. Furthermore geographically major cities are separated by sea or mountain, and politically various systems exist. To overcome difficult condition, we should discuss what difference there is and what mean it is, and works carefully to harmonize and coordinate the rules and regulations.

SIMULATION MODEL OF CAR SHARING SYSTEM CONSIDERING RELOCATION

S. SHIMOHARA
Department of Civil Engineering
College of Science and Technology, Nihon University, Tokyo, Japan

T. SHIMAZAKI
Department of Civil Engineering
College of Science and Technology, Nihon University, Tokyo, Japan

Abstract:

In recent years, air pollution by exhaust gas has been a serious problem. Low Emission Vehicle is being developed to solve this problem. In Japan, Experiments of Car Sharing system by using Electric Vehicle have been introduced. There are two types of CSS, one is Round Trip system, and the other is One-Way Trip system. In Round Trip, user has to return vehicle to the station where user borrowed it. In One-Way Trip, user can return vehicle to other station where user borrowed it. CSS operation in One-Way Trip has a problem that concentration or lack of vehicles at a certain station caused by difference of demand in each station. The paper builds simulation model, which can represent conditions of vehicles and stations, and proposes operation system CSS to reduce need for relocation.

ON A HISTORY AND A PRESENT CIRCUMSTANCE OF WALKING AID FOR PERSONS WITH VISUAL IMPAIRMENT IN JAPAN

H. SEKIGUCHI & NAKAYAMA
Department of Transportation Engineering and Socio-Technology
College of Science and Technology, Nihon University, Chiba, Japan
E-mail: nakayama@trpt.cst.nihon-u.ac.jp

Abstract:

This paper describe a history and a present circumstance about waking aid for persons with visual impairment in Japan. There are approximately 305,000 people with visual impairment include legal blindness in Japan. However, Seeing Eye Dogs are only 875 on duty in 1996. The first Japanese training facility was established in 1967. In the same year, the unique waking guide system, *Tenji-Block (Tactile Tiles or Textural Paving Block)*, has been developed in Japan. It is a title or a paving block that has many small round bumps on the surface. A pedestrian can be walking with feeling bumps at their sole. This system has come into general use in 1970s in Japan. However, it has some problems, for instance, standard or guidelines for design and construction, how to manage the facilities. Recently, Japanese government approved and enacted a "Law to Promote Ease of Movement for Older and Disabled Persons Using Public Transportation Facilities (Barrier-free Transportation Law)" in 2000. And the new guiding systems *ITS for Pedestrian* are developing in Japan. Such movement verifies whether it becomes good news for visually impaired persons.

LEVEL OF BARRIER-FREE OF THE PUBLIC TOILET IN TOKYO

H. Nakamoto
Department of Civil Engineering
College of Science and Technology, Nihon University, Tokyo, Japan
hidenaka@pop06.odn.ne.jp

S. Suzuki
Kawai Construction Co., Japan

T. SHIMAZAKI
Department of Civil Engineering
College of Science and Technology, Nihon University, Tokyo, Japan

Abstract:

The average age of Japan is going up rapidly. The aged or handicapped people feel an obstacle in daily life. It is important that any person can participate without inconvenience in community, including them. They have a right to live ordinary life. Barrier-free facilities can widen the activity area for them. We investigated the level of barrier-free of toilet. We made a toilet map of the toilet which the age or handicapped people can use. The paper investigated Nakano ward in Tokyo as a case study. This area is located in about 10 km from center of Tokyo. Rate of aged people is higher than average rate of Tokyo's wards. We investigated the ward office and library, public hall and park. It is expected that the barrier-free level of a toilet is improved that be based on this analysis.

TRAFFIC SIMULATION: A NEW TOOL FOR TRAFFIC IMPACT ASSESSMENT IN THE PHILIPPINES

GALIZA, RONALD JOHN S.
Instructor, Department of Engineering Science
College of Engineering, University of the Philippines Diliman, Quezon City
E-mail: anj@up.edu.ph

Abstract:

Microscopic models are now widely accepted as providing the most appropriate analytical tool for understanding traffic capacity problems and for assessing the effectiveness of mitigating measures. This tool can be used to identify specifically problem areas in the network. The inherent value of computer simulations is that it allows experimentation to take place "offline" without having to go out in the real world to test or develop a solution.

This paper tackles the issues concerning the development of traffic network models using available traffic simulation software and this was illustrated through a case study. The traffic simulation tool used for the paper is the CORSIM/NETSIM (Network Simulation) developed by ITT Industries. The NETSIM component of CORSIM is a program designed to simulate traffic operations for isolated intersections, arteries, and/or networks.

Data Requirements: The ultimate objective of traffic network simulation is to replicate the situation happening in the field. Thus, a road inventory survey is necessitated in the gathering of physical traffic entities that will become input in the model. Parking Surveys were also conducted to model parking in the study area. The volume entering and maneuvering into and within the study area were from the Volume Count Survey at the intersections.

A model calibration was done in order to quantify model parameters using real-world data. Vehicle characteristics and driver characteristics are the key parameters, which may be site-specific and require calibration.

Model validation was also necessary in comparing model results against corresponding data observed to ensure that such results realistically represent the real world. Commonly used data for validation are queue length, travel time, delay, speed, and density.

After all the data have been inputted, the models are then run in a personal computer. One of the major outputs of traffic simulation is the graphics that is a picture of what is happening in the field. The models developed in the case study exhibited great accuracy in comparison to the measures of effectiveness in the field. The models were accurate with respect to what is the general trend in the characteristics of traffic in the periods analyzed. The models developed were also used to evaluate the different remedial measures that were developed. The effects of these mitigation measures were easily estimated without even actually going to the field for experimentation.

ON THE GIS USING TIME SERIES DATA IN NORTHWEST AREA IN CHIBA

YUSUKE KATO
Undergraduate Students at Department of Transportation Engineering and Socio-Technology
College of Science and Technology, Nihon University, Tokyo, Japan

HARUYUKI NAKAYAMA
Department of Transportation Engineering & Socio-Technology
College of Science and Technology, Nihon University,

Abstract:

It is difficult for ordinary people to understand a long environmental change. The GIS that installed time series data aid their understanding. In this study, the time series data from 1880 to 2000 in northwest area in Chiba have been investigated. These data are composed of spatial data such as topographic map, demographics, economic data, railways, and road networks. The followings are typical findings using this GIS.

This area is the part of Kanto Plain, which is the largest flatland in Japan. The western section of this area is composed of the fertile back marsh and the eastern section is composed of the diluvia upland and narrow swamps. The land-use of the western section is mostly paddy field and Funabashi city center, the largest commercial complex in this area, along the shoreline with Funabashi Port, which is one of the largest ports in Japan.

The population in this area increased rapidly after World War II as a residential are of Tokyo. The population in Funabashi-city has been increased eight times in the period of 55 years from 1945 to 2000. However, the rate of increased in the period of 73 years from 1872 to 1945 was an approximately three times. The rapid explosion of population cause too many environmental problems in this area until now. The road networks which based on Edo era (300 years ago) exists as main road despite more than 25 times explosion of population from Edo era. The residential and commercial area is also expanding 25 times from 1880 up to now. Similarly, it seems as a rate of increase of population.

The land development without urban planning, except Kita-Narashiro and Yachijo-dai area, caused urban problems. The narrow swamps, the fertile, rich and varied

natural environment, are disappearing due to land development for residential area from 1800s and becoming 1/3.

PAVEMENT ENGINEERING

DESIGN AND STRUCTURAL ANALYSIS BY SURFACE DEFLECTION OF ILB PAVEMENT

Y. TODOROKI
Department of Civil Engineering
College of Science and Technology, Nihon University, Chiba, Japan

S. IWAI
Department of Transportation Engineering & Socio-Technology
College of Science and Technology, Nihon University, Chiba, Japan
E-mail:siwai@trpt.cst.nihon-u.ac.jp

Abstract:

This paper begins with a description of the design method for ILB pavement, provides an overview of the test pavement designed by this method and discuss the structural evaluation of the test pavement.

The test pavement was constructed in Chiba Prefecture in November 1998. The number of pavement sections was eight, the length of one section was 20 m, and the overall length of the pavement was 160 m. The pavement structure has been evaluated with reference to surface deflection, once a year since its construction. The third evaluation was done in November 2001.

The obtained results shows that the pavement surface has suffered no significant fractures. The test pavement is still in service and is judged from the structural evaluation by surface deflection to be fully serviceable in the future as well.

BASIC STUDY ON HEAT BALANCE AT PAVEMENT SURFACE

SHIN KAMO,
Graduate Student, Department of Transportation Engineering & Socio-Technology,
Nihon University

SHIGEO IWAI
Associate Professor, Department of Transportation Engineering & Socio-Technology,
COST, Nihon University

Abstract:

In recent year, the heat environment in urban area is getting increasingly worse because hydrological cycle through ground surface in the area is obstructed by which the surface is widely covered by artificial matters as buildings, pavement and so on. It is necessary to understand the heat balance at the pavement surface in order to investigate change of the heat environment in urban area.

In this study, the concept of the heat balance at the pavement surface is discussed and the heat balance at the pavement surface is calculated by the use of field test data of the various pavements and weather data and is also compared each other. For this study, four types of the test pavement are provided. These pavements are dense grade asphalt pavement (DAP), non-permeable inter-locking block pavement (ILBP), permeable porous asphalt pavement (PAP), and water retentivity block pavement (WRBP).

It is clarified that the temperature of base course layer and subgrade layer of the permeable pavement such as PAP and WRBP is kept low condition due to latent heat in the certain layer generated by evaporation of moisture in the each layer, even though the surface temperature of the pavement is higher than the temperature of the each layer in fine weather. These things make it clear that the permeable pavement may function as check on worse of the heat environment in urban area.

EVALUATION OF VARIOUS POLYMER MODIFIED BINDERS FOR POROUS ASPHALT MIX

D. PAGBILAO, B. CADAG, D. DUKA, J. GAJE, V. SANTOS, J. LEGASPI
Technological University of the Philippines
Integrated Research and Training Center, Manila Philippines

A. MALLARI, A. VALERA
Petron Corporation
Manila, Philippines
E-mail: admallari@petron.com

Abstract:

The mechanical properties of porous asphalt mixtures using three polymer-modified binders, coded K10h, T10h and T3-10h, were evaluated. The dry compressive strength, index of retained strength, skid resistance and rutting resistance of porous mixtures prepared at optimum asphalt content were evaluated against the standard criteria for pavement surfacing materials. T10h and T3-10h mixes exhibited very satisfactory results, while K10h mix partially satisfied the requirements. A comparison of these mixes, with a dense graded mix using penetration grade asphalt cement, was also undertaken to determine the advantages of a porous mix over a dense grade mix when employed as a surfacing material. In addition, a comparison of the polymer-modified binder porous mixes with a penetration grade porous mix was made to determine the benefits of using polymer-modified binders.

PROPERTIES OF CRUMB RUBBER-MODIFIED ASPHALT AND ASPHALT MIXTURE

D. PAGBILAO, M. AALA, J. AGBUYA, R. BARRERA, A. LABARDA AND R. PAGILAGAN

Technological University of the Philippines
Integrated Research and Training Center, Manila, Philippines
E-mail: dspagbilao@quickweb.com.ph

Abstract:

The study compared the properties of crumb rubber-modified and non-modified asphalts, and also the compacted properties of crumb rubber-modified and non-modified asphalt mixtures. Crumb rubber, particle size 0.075 ~ 1.19 mm, was added to Pen 60/70 and Pen 85/100 penetration grade asphalt cements at 2.0%, 4.0% and 6.0% by weight of the asphalt cement.

The physical properties (specific gravity, penetration, viscosity, softening point, ductility) of the crumb rubber-modified asphalt binders were evaluated and compared with the physical properties of their base asphalt binders. Results showed changes in the properties of the binders that are deemed beneficial when used for asphalt mixtures for pavement surfacing.

The mechanical properties (Marshall properties, compressive strength, index of retained strength, skid resistance and dynamic stability) of compacted asphalt mixtures using rubber-modified asphalt binders were also evaluated and compared with the mechanical properties of asphalt mixtures using the non-modified base asphalt binders. Results also showed improvement in all the properties tested.

LABORATORY INVESTIGATION OF RECLAIMED ASPHALT PAVEMENT (RAP) FOR ASPHALT SURFACING

D. PAGBILAO, A. BARRA, S. ESGUERRA, S.L. IGNACIO, E. REYES, M. TAÑAG
Technological University of the Philippines
Integrated Research and Training Center, Manila, Philippines
E-mail: dspagbilao@quickweb.com.ph

Abstract:

In the Philippines, the use of reclaimed asphalt pavement (RAP) materials for asphalt mixtures is not common practice. One reason is that there is no local experience that documents its suitability. This laboratory study is a first attempt to evaluate the suitability of using RAP materials for asphalt pavement surfacing.

RAP materials stockpiled at the South Manila Engineering District was processed into granular material by simple oven heating and manual segregation then used as aggregate component, fully and partially, in hot mix asphalt. The asphalt mixtures consisting of RAP and virgin aggregates, with new asphalt cement binder, were evaluated by undertaking standard laboratory tests as follows: first, the Marshall Test (ASTM D 1559) was used to determine if the mixtures considered are suitable. The mixes satisfying the Marshall Design Criteria for heavy traffic were further evaluated by the following standard methods: Compressive Strength of Bituminous Mixtures (ASTM D 1074), Index of Retained Strength (ASTM D 1075), Wheel Tracking Test and Skid Resistance Test. Test results showed that adequate mix properties can be achieved with mixtures containing 55% RAP.

PRESERVATION OF NATURAL TREASURES AND HISTORICAL STRUCTURES

THE STUDY OF AN EVALUATION MODEL ON MODERN CIVIL ENGINEERING INFRASTRUCTURES – THE CASE STUDY OF THE WATER POWER PLANTS

YOKO HORIKAWA and TAKASHI ITOH
Department of Civil Engineering & Socio-Technology
College of Science and Technology, Nihon University, Chiba, Japan
E-mail: yoko_horikawa@trpt.cst.nihon-u.ac.jp
E-mail: itoh@trpt.cst.nihon-u.ac.jp

Abstract:

The Japan Society of Civil Engineers (JSCE) made the research of modern civil engineering infrastructures from 1993 to 1995. But JSCE attached importance to the constructional point of view and didn't research the infrastructures much repaired, reconstructed or removed. Therefore we make Historic Remains and Sites Evaluation (HIRSE) model on modern civil engineering infrastructures in case of the water power plants. This model attaches importance to "history of sites" and "system technology". We apply HIRSE model to 20 important water power plants selected by the Agency for Cultural Affairs in Japan. And we indicate HIRSE model can find new values of the modern civil engineering infrastructures much repaired, removed and reconstructed.

COVERED BRIGES WITH SMALL TEMPLES IN BHUTAN

TAKASHI ITOH
Department of Transportation Engineering & Socio-Technology
College of Science and Technology, Nihon University, Chiba, Japan
E-mail: itoh@trpt.cst.nihon-u.ac.jp

Abstract:

We can see covered bridges here and there, though are not so many, in the world. For example, in U.S.A., Canada, Switzerland, Germany, Russia, china, Japan, Indonesia and so on. They are full of varieties in styles and design reflecting their national or racial culture.

The covered bridges in Bhutan have temples at the both ends of a covered bridges. The purpose of this paper is to clear the function of the small temples, how they have been used and the type, size, structure and materials of the covered bridges and abutment.

A STUDY ON ENVIRONMENTAL PROTECTION OF LAKES – TAKING THE CASE OF WATER ENVIRONMENT OF LAKE INBANUBA

Y. MORITA
Department of Construction
Junior College, Nihon University, Chiba, Japan
E-mail: ymorita@arch.ion.nihon-u.ac.jp

Y. MIURA and S. IWAI
Department of Transportation Engineering & Socio-Technology
College of Science and Technology, Nihon University,
Chiba, Japan

H. MATSUSHMA
Department of Civil Engineering
College of Science and Technology, Nihon University,
Tokyo, Japan

Abstract:

Fresh water is closely related with human life. On the global scale, the volume of fresh water in circulation is virtually constant (about 150 trillion cubic meters), and this volume is estimated to be used by 10 billions of people in the near future. Therefore, how to ensure the supply of fresh water is an important problem in all countries of the world including Japan. In Chiba Prefecture, Lake Inbanuma provides a source of drinking water for about a million of inhabitants of the prefecture. However, the quality of this water is the world in the country because its COD is very high. Based on the results of research on the actual conditions of land-use, farm work and irrigation system around the lake, this paper shows that the yearly inflow of large amounts of nutritive salts contained in the irrigation water and fertilizers contributes to the eutrophication of the lake.

STATE-OF-THE ART PASSIVE FIRESTOPPING SYSTEM APPLICATION IN BUILDINGS

MARVIN RONQUILLO, RAMIL CRISOLO, GILBERT BALBUENA, and DR. PABLO JORILLO
HILTI (PHILIPPINES) INC.,
2326 Pasong Tamo Ext. Makati City, Philippines
moph@hilti.com

Abstract:

This paper describes the current fire stop regulations and engineering codes enforced in building constructions in the Philippines. Principles of spread of fire in buildings, and the methods and systems to stop fire are presented. Emphasis is given on compartmentation principle using the passive firestop systems and the design criteria using international standards and certification methods are likewise discussed. Overview of the application of the system in large projects in Metro Manila is also presented.

GEOTECHNICAL ENGINEERING

MECHANICAL CHARACTERISTICS OF LIGHTWEIGT GEOMATERIALS UNDER CYCLIC LOADING

K. MINEGISHI, K. MAKIUCHI, R. NEMOTO and S. KUZU
Department of Transportation Engineering & Socio-Technology
College of Science and Technology, Nihon University,
Chiba, Japan
E-mail: kmine@trpt.cst.nihon-u.ac.jp

Abstract:

Fundamental mechanical properties of lightweight soil subjected to cyclic stresses such as traffic loads were investigated using a dynamic triaxial compression apparatus. The soil used in this test was a cohesive soil of high moisture content and it was often abandoned as a surplus soil in a construction spot: therefore, to re-use effectively such soil is greatly worthwhile as a countermeasure for environment conservation. The lightweight specimens, blended with expanded polystyrene (EPS) beads and treated with Portland cement, were compacted in a mold and a series of cyclic triaxial tests was carried out for them under unconsolidated undrained conditions. Effects of compressible beads lateral confining stress, repetitive stress level, and number of stress repetitions on the deformational performance were researched and discussed. It was found from the experimental result that the unnatural soil mixed with air-entrained beads demonstrated dissimilar mechanical properties from the ordinary natural soils that consist of incompressible solid particles.

GEOFORM TRENCH WALL METHOD FOR REDUCING GROUND VIBRATION

Y. MIZUTANI, K. MAKIUCHI, K. MINEGISHI and M. MIZUKAMI
Department of Transportation Engineering & Socio-Technology
College of Science and Technology, Nihon University, Chiba,
Japan
E-mail: yousuke_mizatani@trpt.cst.nihon-u.ac.jp

Abstract:

Effects of two ground trench walls, composed of an expanded polystyrene block and a cast-in-place rigid polyurethane, on the reduction of public nuisance of the propagated ground vibration were investigated in field tests. These geoform wall methods had been applied for the first time in the world to the vibration reducing purpose.

The reduction effects of frequency, depth of open trench, two type of geoform were observed in detail using full-scale experiments. The results indicated these ground wall methods could reduce a marked improvement of polluted vibration level.

* * *

ABSTRACTS OF PAPERS

3rd Pacific Asia Conference on Mechanical Engineering

PLENARY LECTURES

CAPACITY BUILDING FOR ENGINEERS

ACADEMICIAN REYNARDO B. VEA
President, Mapua Institute of technology

Abstract:

The goal determines the level of effort. A goal of achieving world-dominating engineering prowess, for example, will require capacity-building efforts markedly different from a goal of being the best in some small niche. A goal a generator of new knowledge and innovations would require different level of exertion from a goal of being the global supplier of an army of ICT-savvy engineers. The definitions of objectives should therefore the first order of the day.

But be that as may, the elements of capacity building may be discussed in a general way. Whether an elements may be included, and in what level of intensity, remains to be determined based on objectives.

An engineer may be called upon to perform a host of functions: design, survey, construction, manufacturing, operation, evaluation, consulting, teaching, research, etc. The basic elements of this empowerment in being able to do most if not all of these are: understanding of basis principles, engineering knowledge and skills. How we make sure that our engineers acquire these is the basic challenge in capacity-building. How we provide and utilize ICT tools in this process is our concern.

The process begin, but does not and should not end, in our schools. The professional life of an engineer should be one of continuous study, learning and honing.

Most quarters have accepted that the demand for lifelong learning will increase in the years to come. This belief, together with our school' desire to use new educational technology, fuels the development of ICT application in e-learning. There may be plenty of hype but there indeed are ways by which computers and networks have proven effective in the teaching and learning process. Simulation software has been a bright spot. The Web has become a tool for the efficient and quick interaction of teachers and students. Beyond this the Web has also started to enable schools to share their libraries and other educational materials and even their faculty with other schools around the world. This has put in the hands of scholars an amazing wealth of knowledge and resources that enables them to become better students and teachers.

In an era of global outsourcing of engineering services it behooves all engineering schools to impart to its students the most advanced problems-solving methodologies and tools, including engineering software

After schooling, engineers depend, among others, on the colleagues in professional societies to keep up with developments in their fields. ICT is increasingly becoming an indispensable tool to get the vital pieces of information from local and global sources. For capacity building our engineering societies must be thoroughly wired and able to help their members navigate electronically through the mass engineering data and information available worldwide. This would ensure the use of the state-of-the-art in problem solving.

If heightening engineering R&D capacity is among our objectives then ICT can play a natural role in capacity building. The many-to-many nature of the internet has dramatically facilitated collaborative research work. It has enabled scientific projects that never sleep. Researchers can now share electronic for a that allow great number of enquiring minds to focus simultaneously on any given topic. Experiments could be set up, theories proposed and data reported very quickly. The lag time between conferences and publishing has simply evaporated. With electronic publications, the traditional of circulating preprints only to a small exclusive group of researchers in big, prestigious laboratories has been broken. Laboratories everywhere, including those in the Philippines, can join the fray.

Some aspect of capacity building for engineers may only be weakly related to ICT at the moment. For example, the need to strengthen the understanding of fundamental scientific principles and the facility with advanced and mathematical tools, the need to develop communication skills; the need to relate engineering to the universe of knowledge; the development of engineering judgment, etc. But even in these matters one can see how ICT can possibly fit in.

ICT will be no panacea but it will be indispensable to engineering capacity building.

MAINTENANCE AND MANUFACTURING ENGINEERING

A STUDY OF FORMING FLANGE WITH GROOVES IN THE OUTER SURFACE BY USING THICK METAL PLATE

YUKIHIKO UCHIDA, MICHIHIKO HOSHINO
And TERUYUKI MAEGAWA
Department of Mechanical Engineering
College of Science and Technology, Nihon University
Tokyo, Japan
E-mail: mae-fb@st.mech.cst.nihon-u.ac.jp

Abstract:

Up to the present, flange like a pulley which has grooves in the outer surface usually have been produced by the way of machining or casting. However, in machining, utilization ratio is improper and its cost becomes high. And, casting has a problem that the geometry of the product is not precise. Though the flange also can be formed by plastic forming, the forming process becomes complex, and a forming load becomes high in the usual method. So, in this investigation, it is purpose to establish how to form the flange with grooves by a new way of reverse redrawing which is a kind of deep drawing method. By establishing the new forming method, a forming load becomes low, the strength increases by strain hardening, and a cost becomes down.

This flange with the grooves is formed by three processes. In the first process, the circular blank is drawn to a cup. The blank material is aluminum (A1050), the thickness is 4mm, and the blank diameters are 86, 88, 90mm. In the second process, the edge of the cup is formed by compressing. The

edge's width becomes thick and products having grooves, for example pulley or gear, are made in that process. The compression ratios are 1.5, 1.7, and 1.9. In the third process, the cup is formed by reverse redrawing. When the edge of the cup with grooves becomes level, the stroke of redrawing is stopped and the cup with required shape is gotten. At first, simulation is carried out by using the FEM simulator (DEFORM-2D) for several conditions. After that, experiment is carried out. Then, both results are compared and it is examined that the flange is possible to form or not. Relation between the experiment and the simulation, for example a load-stroke curve and a shape of product, under the consideration of the condition which the flange can be formed is examined. As the result, it is found out that the simulation has good agreement with an actual experiment.

PERFORMANCE EVALUATION AND EFFIECIENCY TEST OF A SAW DUST, RICE HUSK AND CHARCOAL FIRED MECHANICAL DRYER UTILIZING OUTSIDE AIR AND RECIRCULATED AIR FOR THE PURPOSE OF WASTE HEAT RECOVERY

ARCHIE B. MAGLAYA
Mechanical Engineering Department
De La Salle University, Manila

Abstract:

This paper describes the result of the study on the performance evaluation and efficiency test of a mechanical dryer utilizing outside air and recirculated air for the purpose of waste heat recovery. Testing of the mechanical dryer includes drying of agricultural crops such as: palay, corn and coconut meat using saw dust, rice husk and charcoal as fuel. Parameters required during the performance evaluation are the following: determination of Dryer Capacity, Drying Rate, Burner or Combustion Efficiency, Heating Chamber Efficiency, Drying Chamber Efficiency and Overall Dryer Efficiency. Another important aspect of the study is the quality evaluation of the dried product. Results of the evaluation showed that the utilization of waste heat which is done by recirculating the exhaust air for pre-heating the outside air increases the drying rate and rate of moisture removal in the wet feed. The moisture removal on palay and corn conforms to standard values of 13-16% moisture content of dried product for safe storage and milling especially when charcoal is used as fuel compared with saw dust and rice husk.

A STUDY OF THE DATABASE FOR AN EXTRUSION PROCESS DESIGN

K. MATSUZAWA, Y. UCHIDA, M. MICHIHIKO
Department of Mechanical Engineering
College of Science and Technology, Nihon University
Tokyo, Japan
E-mail: mats792@attglobal .net

Abstract:

In extrusion, knowledge and experience are needed in order to design extrusion processes and tools, therefore it is important to construct a database for extrusion conditions. In this study, a simulation is taken in die design of extrusion and it aims at construction of the database in extrusion processing. This time, the port hole die to manufacture a hollow product is examined as an example, hole shapes and mandrel shapes are analyzed the influence which they have on a product and extrusion load. Model experiment by using platicine is carried out and materials flow is observed. Furthermore, its flow in a die is investigated by FEM simulator. It is found that the flow condition in a die, an extrusion load and a contact surface of a billet with a hole by changing varying and mandrel shape.

DESIGN AND EVALUATION OF A WATER PUMPING WINDMILL FOR SMALL SCALE IRRIGATION

PABLITO O. ANINO SR.
Mechanical Engineering Department
Notre Dame University, Cotabato City

ARCHIE B. MAGLAYA
Mechanical Engineering Department
De La Salle University, Manila
coeabm2@mail.dlsu.edu.ph

Abstract:

This paper explains the design and development of a wind power water pumping system to be used in rural areas in the Philippines, particularly in remote villages in Mindanao, a typhoon free island, for irrigation and also for domestic water supply purposes. The wind pumping mechanism is a mechanical, multi-bladed windmill using a submersible piston pump which has an average discharge of 3.2 gpm at 3.7 m/s wind speed, lifting water by 4 meters. Wind speed data covering twenty year period, taken from the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) station were used and also verified by actual wind data gathering using simple hand held wind gage and Beaufort scale to determine the feasibility and viability of the wind site selected. Tests where conducted to evaluate the performance characteristics of the installed wind pump and to measure maximum wind potential in the area. Results of the study and tests showed that full utilization of wind power for water pumping in the areas selected and the neighboring towns and villages are technically feasible and economically attractive.

DESIGN AND DEVELOPMENT OF A TWO-MOLD COMPACTOR

LOT B. RAMIREZ, GONZALO C. SALVADOR, JR., CARLOS P. ZAPANTA and LORETO G. AGUILA
Integrated Research and Training Center
Technological University of the Philippines
Manila, Philippines

Abstract:

A two-mold compactor was developed at the Integrated Research and Training Center. It is manually operated. This compactor is portable and simply designed. It is made up of 27 detachable components. The compactor can

compress various materials. However it was designed to produce soil, clay or aggregate and cement mixture blocks with maximum dimensions of 196 mm long and 96 mm wide. The thickness of the block produce by this compactor may be varied depending upon the piston setting. This paper describes the design and development of a utility model that can be effectively employed in the manufacture of low-cost construction materials. The prototype equipment, basically a manually operated press with two square hole and two piston, was conceived to compact lahar and cement mixture or other alternative materials to produce pavement blocks or blocks to be used in low cost-housing. The press is conveniently called Two Mold Compactor.

ANALYSIS OF CONFORM EXTRUSION

MOTOCHIKA YOSHIDA, YUKIHIKO UCHIDA, MICHIHIKO HOSHINO
Department of Mechanical Engineering
College of Science and Technology, Nihon University
Tokyo, Japan
E-mail: motochika@nifty.com

Abstract:

Conform extrusion is suitable for producing long products such as electric wires and heat exchanging pipes etc. Forming power of this processing is given by rotating wheel. And the metal which flow direction is changed by an abutment is supplied to a container, and is extruded from a die. However, this manufacturing method has the problems that metal flow becomes complicated and that oxidization film is caught in products, because the flow direction is changed rapidly by the abutment. Then, in this study, model experiment by using plasticine is carried out and the materials flow is observed. It is clear that geometries of the abutment and container have much effect on the load in the abutment and the die.

A STUDY ON PRESS BENDING WITH INNER PAT OF ALUMINUM SECTIONS

YUKIHIKO UCHIDA, MICHIHIKO HOSHINO
And SHINYA FUJITA
Department of Mechanical Engineering
College of Science and Technology, Nihon University
Tokyo, Japan
E-mail: sfujita@mub.biglobe.ne.jp

Abstract:

The global warming phenomenon by CO2 emitted from cars is mentioned as the most serious matters in global environment problems. It is thought that the improvement in rate of fuel consumption is expected by development of the lightweight transport machine made of many aluminum parts, and it leads to the improvement of an environmental problem.

Bending of extruded aluminum pipes is used in many cases as secondary forming. However, the poor deformations as crack and buckling occurs in extruded aluminum pipes when press bending. Former, the poor deformation was predicted by repeating experiments. But, the simulation using the finite element method became possible by the software and hardware of a computer developed quickly in the past about ten years. Then, with increasing of accuracy in the FEM analysis, it has been performed usually aiming at curtailment of development costs and improvement of productivity. In this study, press bending which used inner pads was invented by using the FEM simulation and the experimental method.

Press bending with inner pads can prevent various types of poor deformation generated during press bending of extruded aluminum pipes. As the result of measurement, distortion in FEM simulation was larger than distortion in experiment. This cause is considered that extruded aluminum pipes sink into the inner pad in FEM simulation.

COMPARATIVE PERFORMANCE OF A ROTARY-DRUM TYPE AND A LIQUID-ASSISTED MECHANICAL-DRIVEN GARLIC PEELERS

FELIPE RONALD M. ARGAMOSA
Integrated Research and Training Center
Technological University of the Philippines
Manila, Philippines

Abstract:

Garlic is a very popular cooking ingredient. In small to medium scale food establishments large amount of peeled garlic are needed in order to facilitate the production of large amount of garlic. Technological University of the Philippines Mechanical Engineering Department has come with a prototype design that will answer a need to develop a garlic peeler machine. Two prototypes were developed: namely Reciprocating Grill Type and Rotary Drum Type Garlic Peeler. Evaluating these machine has shown that the Grill Type Machine Peeler has increasing peeling capability as the charging size increases with a corresponding increase in rejects while the rotary type garlic peeler has a decreasing peeling capability as the charge size increases although the defect amount also decreases.

THE FORMING OF A SPUR GEAR MADE FROM THE DRAWN CUP

Y. UKEI, Y. UCHIDA and M. HOSHINO
Department of Mechanical Engineering
College of Science and Technology, Nihon University
Tokyo, Japan
E-mail: M051006@edu.cst.nihon-u.ac.jp

Abstract:

In a previous report, a new production method was proposed in which a spur gear was made from a drawn cup by plastic working. This forming method consists of four processes, namely, drawing, re-striking, ironing and compressing. However the formi..g of steel gears is not suitable for the actual production because the forming pressure in the compressing process is too high and the filling ratio is not sufficient. Therefore it is examined to reduce the forming pressure and improve the filling ratio by two versions of the divided flow forging method. One consists of flowing materials into the opposite side of a tooth using a cushion punch with grooves. The other consists of flowing materials into the clearance between the cushion punch the

compressing plate which enlarges the bore. It is found that the divided flow methods are able to improve the filling ratio and reduce the forming pressure. A deformation mechanism by FEM simulation is very similar to the experimental result, and it can be used to estimate the filling ratio and forming pressure.

PERFORMANCE EVALUATION OF WATER-TO-AIR AND WATER-TO-WATER HEAT EXCANGER AIR-COOLER

REY CRISANTO P. HIZON, VALENTINO J. ANGELES, ANDRES D. MAGLAGUI and CARLOS E. ZAPANTA
Department of Mechanical Engineering
Integrated Research and Training Center
Technological University of the Philippines
Manila, Philippines
rchizon@yahoo.com

Abstract:

A new design of cooling system for a spot air cooler was developed. The objective was to replace cooling by water evaporation, because it increases the humidity, causing the user to fill uncomfortable after a short period of use. This new design uses a water-to-air (evaporator) and water-to-water (condenser) heat exchanger in absorbing and rejecting heat, thus minimizing the increase of humidity.

Experimental runs revealed that the maximum pull-down of air temperature after passing through the evaporator coils with a temperature of 12°C, is 6° and 23% reduction in the relative humidity. The result obtained is highly depended on the ambient condition.

THREE DIMENSIONAL MEASUREMENT OF MICRO SHAPES

TAKAZO YAMADA, NOBORU TAKITA
And HWA-SOO LEE
Department of Mechanical Engineering
College of Science and Technology, Nihon University
Tokyo, Japan
E-mail: lee@mech.cst.nihon-u.ac.jp

Abstract:

In grinding operation, geometrical shapes of grinding wheel surfaces are directly copied to machined workpieces. And then, in order to obtain workpieces with high quality, the surfaces of grinding wheels have to be generated and monitored precisely before carrying out the machining process. From such a viewpoint, this study aims to monitor and evaluate the three dimensional shapes of grinding wheel surfaces precisely. At the first step of this study, a basic concept to monitor the three dimensional shapes is proposed. In this method, using a laser displacement sensor, three dimensional geometrical shapes in micron order are evaluated. At the result of trial measurements, it is confirmed that the micro shapes can be monitored quantitatively, the basic concept of the present method will be reported.

DEVELOPMENT OF A MICRO XY STAGE FOR MICRO MACHINING

HWA-SOO LEE, KOICHI FUCHI, DAISUKE KOMAKI and TAKAZO YAMADA
Department of Mechanical Engineering
College of Science and Technology, Nihon University
Tokyo, Japan
E-mail: lee@mech.cst.nihon-u.ac.jp

Abstract:

In order to carry out the micro machining of small objects in micron order, it may be very important to develop not only micro machining tools but also precise positioning equipments for tools and workpieces. From such a viewpoint, an XY stage used for positioning workpieces in sub-micron order is developed. The present stage consists of elastic hinges and is driven by piezo electric actuators. Applying a closed loop control based on plural gap sensors, this system can be driven in the 20 nm resolution. In this paper, a design concept of the XY stage for micro machining is described and the kinetic accuracy of a prototype is evaluated. Furthermore, utilizing this stage, some machined examples in micron order are shown.

DETECTION OF OPERATION ABNORMALITY OF BALL BEARING WITH ULTRASONIC TECHNIQUE

AKITOSHI TAKEUCHI
Department of Intelligent Mechanical Systems Engineering
Kochi University of Technology
Kochi, Japan
E-mail: takeuchi.akitoshi@kochi-tech.ac.jp

Abstract:

The indentation is generated on the bearing surface by solid contact or contamination of wear particles, when bearing driven in the mixed lubrication region or contaminated lubricant was used. Then, the decrease in the bearing life with the flaking induced by the indentation becomes a serious problem.

In this study, the application of ultrasonic diagnosis was attempted for the detection of the abnormality of rolling bearing. In the diagnosis, ultrasonic waves with constant sound pressure is emitted to contact surface between housing and outer ring of rolling bearing , and the abnormality is detected from the reflective echo waveform. Then, ultrasonic wave is emitted to contact surface between bearing housing and rolling bearing outer ring, and the abnormality is detected from the reflective echo waveform.

As the result, it was clarified that echo height suddenly fluctuated by influence of the damage on orbital plane and contamination of wear particles. Then, the possibility of evaluation of the lubricated condition and early detection of the abnormality was shown on the basis of the observation of magnitude and frequency of such echo fluctuation.

DESIGN AND FABRICATION OF A MECHANICAL DRYER TRAINING APPARATUS USING INDIGENOUS WASTE MATERIAL AS ALTERNATIVE FUEL

LEODEGARIO F. HIDALGO and ARCHIE B. MAGLAYA
Mechanical Engineering Department

De La Salle University
Manila, Philippines

Abstract:

This paper discusses the result of the research project conducted by the author funded by De La Salle University Research Coordination Office in connection with the Mechanical Engineering Department trust on the development of laboratory equipment using locally available materials. The project involves the design, fabrication and performance evaluation of a Mechanical Dryer Training Apparatus. The significance of the study focus on the mechanical drying of agricultural products using indigenous waste materials such as saw dust, rice husk and charcoal as an alternative fuel. This will provide a hands-on experience for the students on the use of renewable energy resources. The apparatus was designed on the basis that it will utilize 100% outside air supply. Performance testing includes drying of agricultural crops which includes: palay, corn and coconut meat. Instrumentation was also included since the dryer was purposely intended for training and instructional use. Students performing experiments can monitor and evaluate the efficiency of the dryer.

ENERGY AND THERMODYNAMICS

INFLUENCE OF HOT RESIDUAL GAS ON COMBUSTION USING ALCOHOL FUEL

AKIRA IIJIMA, KENJI YAMADA, NORIYUKI YAMADA, KOJI YOSHIDA and HIDEO SHOJI
Department of Mechanical Engineering,
College of Science and Technology, Nihon University
Tokyo, Japan
E-mail: m052001@ude.cst.nihon-u.ac.jp

Abstract:

In this research, the influence of hot residual gas and the compression ratio on combustion was investigated when a two-cycle engine was operated on methanol fuel. The light emission intensity of the OH radical (characteristic spectrum of 306.4 nm) was measured as a general indication of the combustion state of the combustion chamber. The light emission intensity of the OH radical was extracted through each observation window holder on the intake port side and the exhaust port side. The spark plug washer temperature and the combustion chamber inner wall temperature were measured as a general indication of the combustion state of the combustion chamber.

With methanol as the test fuel, bulk combustion (autoignited combustion) occurred when operating conditions such as the quantity of hot residual gas and compression ratio were exceeded. Bulk combustion is able to occur high pressure, rapid combustion and decrease emission of unburned HC's (hydrocarbons) in comparison with normal combustion. However, preignition occurred when operating condition loads were increased.

With methanol as the test fuel, it was seen that preignition was more apt to occur when the quantity of hot residual gas or compression ratio were increasing. In the cased of same compression ratio, preignition occurred rapidly under large quantity of hot residual gas condition to a certain extent. In contrast, the cased of same level of internal EGR, light preignition was confirmed before severe preignition under high compression ratio. In this research light preignition define transition state normal combustion to severe preignition.

EXPERIMENTAL RESEARCH CONCERNING OF THE COMBUSTION STATE AND EXHAUST GAS COMPOSITION OF A SMALL 2-CYCLE ENGINE

TAKUTO MORINAGA, AKINORI YAMAZAKI,
KOJI YOSHIDA and HIDEO SHOJI
Department of Mechanical Engineering,
College of Science and Technology
Nihon University, Tokyo, Japan
E-mail: shoji@mech.cst.nihon-u.ac.jp

Abstract:

This paper presents the results of experiments conducted with a 2-cycle engine that was the world's first such engine to comply with the 2000 California emissions regulations for small off-road engine adopted by the U.S state in 2000. This engine is fitted with a scavenging passage that runs around the crankcase before the scavenging port. The aim of this research was to investigate how changes in the quantity of heat transferred to the fresh air as a result of varying the length of the scavenging passage would affect the state of combustion and exhaust gas composition.

The test engine used in this study was a single-cylinder air-cooled 2-cycle gasoline engine displacing 40 cc and equipped with a Schnurle scavenging system. The engine was operated at a speed of 5000 rpm in all the experiments, and a mixture of regular gasoline (91 RON) and oil was prepared at a ratio of 40:1 for use as the test fuel. The air-fuel ratio was set at stoichiometric proportions. As shown in Fig. 1, three different scavenging passage lengths were tested, with the longest length denoted as Condition A, one-half of that length denoted as Condition B and the shortest length denoted as Condition C. When not in use, scavenging passage entrances were blocked to prevent the mixture from entering the passage there. A crystal pressure transducer was integrated with the spark plug to obtain cylinder pressure measurements. As shown in Fig. 2, an ion probe was fitted to the end zone of the combustion chamber in order to detect the state of combustion. A voltage of 60 V was applied to the ion probe and measurements were made of the voltage drop that occurred due to the presence of high concentrations of ions (H_3O^+, $C_3H_3^+$, CHO^+, etc.) at the flame front. The exhaust gas composition was investigated by using an exhaust gas analyzer to measure the concentrations of HC's, CO, CO_2 and O_2 in the exhaust.

The experimental results showed that charging efficiency declined and power output dropped slightly due to higher intake resistance as the length of the scavenging passage was increased from Condition C to Conditions B and A, but emissions of unburned hydrocarbons (HC's) and carbon monoxide per unit of power output tended to decrease. The measured data also indicated that the state of combustion was improved with a longer scavenging passage.

AN ANALYSIS AND EVALUATION OF PHILIPPINE CALATRAVA COAL –DIESEL OIL MIXTURE AS SLURRY FUEL FOR INDUSTRIAL PURPOSES

ARCHIE B. MAGLAYA
Mechanical Engineering Department
De La Salle University, Manila
E-mail: coeabm2@mail.dlsu.edu.ph

Abstract:

This paper presents the result of the study on the evaluation of Philippine Calatrava Coal-Diesel Oil Mixture as slurry fuel for industrial purposes. The study involves the investigation of the properties of coal-diesel oil mixture (COM) such as ash content, carbon residue, flash point temperature, specific gravity and density, viscosity, sulfur content, water and sediment, higher heating value, and shelf life and stability. COM samples with pulverized coal size ranging from –50 + 100 mesh, -100 + 200 mesh and –200 mesh with different blends of 5% coal–95% diesel oil, 10% coal-90% diesel oil, 15% coal-85% diesel oil and 20% diesel oil where subjected to experimentation. Results of the analysis showed that the COM fuel sample having a blend of 5% coal-95% diesel oil with pulverized coal size of –200 mesh has the most number of properties similar to diesel oil.

AN ANALYSIS OF LIGHT EMISSION INTENSITY BEHAVIOR MEASURED SIMULTANEOUSLY AT DIFFERENT POINT IN THE COMBUSTION CHAMBER

AKIHIRO KAKISHIMA, HIRONORI OHARA, HIDEAKI KASHIWAGI, KOJI YOSHIDA and HIDEO SHOJI
Department of Mechanical Engineering,
College of Science and Technology
Nihon University, Tokyo, Japan
E-mail shoji@mech.cst.nihon-u.ac.jp

Abstract:

One of major factors that impedes the further improvement of the thermal efficiency of spark-ignition engines is knocking. If knocking could be suppressed, that would allow us to use an engine with higher compression ratio for improved thermal efficiency, and thereby fuel consumption could be reduced.

For the further research of knocking, this study deals with preflame reactions that are observed prior to the autoignition in the process of combustion reactions of hydrocarbon fuels with light emission spectroscopy. Therefore, we focused on light emission behavior at wavelengths corresponding to the spectra of the formaldehyde, (HCHO; characteristic spectrum of 395.2 nm), Vaidya's hydrocarbon flame band (HCO; 329.8 nm) and the OH radical (306.4 nm) during a transition from normal combustion to knocking operation. This study simultaneously observed light emission behavior in two positions (the end zone and the center zone) of the combustion chamber. Test fuel used n-heptane (0 RON). The test engine was operated at a constant boost pressure. And we observed light emission behavior under different engine speeds. In this study, a progression from normal combustion to knocking operation was induced by reducing the supply of cooling air to the cylinder head, causing it to overheat.

In the end zone, the behavior corresponding with the passage and the degeneracy of a cool flame was observed. And we analyzed preflame reaction intervals in different engine speeds. From the result of analysis, we observed different tendency of preflame reaction intervals at different engine speeds.

COMBUSTION CHARACTERISTICS OF A MONO-SIZED PARTICLE GROUP IN SUPER CRITICAL ENVIRONMENTS

TETSUYA MATSUMURA, MITSUAKI TANABE
And KIYOSHI AOKI
Department of Aerospace Engineering, College of Science and Technology, Nihon University, Chiba, Japan
E-mail: tetsu@xg7.so-net.ne.jp

Abstract:

Combustion characteristics of spray combustion in supercritical environments are considered to differ from those in subcritical environments. Single droplet and droplet array combustion experiments in supercritical environments have been performed so far. They have found difference in the characteristics of the two cases. This study has been conducted to investigate on the combustion of mono-sized particle group in supercritical environments, to relate the results on single droplet and droplet array with actual spray. Mono-sized octadecanol particles of 35μm, 55μm and 135μm in Sauter mean diameter (SMD) were prepared in advance by filtering sprayed droplets. The fuel particle group is injected into a combustion chamber made of stainless steel by compressed air, to diffuse. Initial pressure of the combustion chamber is adjusted by pumping up using compressed air. The flame propagation velocity for the three particle sizes was determined varying initial pressure and keeping equivalence ratio unity.

The result shows that the flame propagation velocity takes a maximum in non-dimensional pressure Pr=1.2 (initial pressure / critical pressure of the fuel). It is higher as the particle diameter becomes smaller. This trend is analyzed taking heat conduction, diffusion coefficient and heat flux into account.

COMPRESSOR TYPE AND INPUT POWER EFFECTS ON THE TEMPERATURE-TIME CHARACTERISTICS OF A SPLIT TYPE AIRCONDITIONER

RICARTE C. NUÑEZ, and JUAN A. ITURRALDE,
Western Institute of Technology, La Paz, Iloilo City

Abstract:

A split type airconditioner with a 1-Hp input power rating rotary compressor is employed in this work. Two additional compressors, a 1-Hp reciprocating (piston-type) and 1.5-Hp rotary type were installed in parallel with each other to become part of the whole system and operated in a room specifically intended for the operation of the airconditioner. Appropriate pipings, pressure gages, fittings, valves and temperature measuring devices were also installed to monitor anytime the values of the measured refrigerant and air properties at various designated locations. Cooling loads for the room were

calculated and maintained for each trial test. The purpose of this experiment is to obtain actual temperature-time plot for each of the compressors and to know the corresponding temperature cooling behavior inside the room. Experimental results from these tests showed the usual exponential temperature behavior during the cooling of the room, their similarities and differences with varying input powers and types of compressors. The characteristic curves (Temp-Time) generated is hoped to find its usefulness in the design of a more optimized and efficient room air conditioners.

BURNING VELOCITY OF THE FLAME PROPAGATES THROUGH FUEL CONCENTRATION GRADIENT

KEIJI YAMAGUCHI, MITSUAKI TANABE
And KIYOSHI AOKI
Department of Aerospace Engineering,
College of Science and Technology
Nihon University, Chiba, Japan
E-mail: yamaguti@qq7.so-net.ne.jp

Abstract:

Recently, internal combustion engines are asked for simultaneous decrease of pollutant emission materials and the fuel consumption rate. The partially premixed combustion is expected as a new combustion method which realizes such demands. It puts into practical use with the direct ignition gasoline engine and so on in some case. The method achieves ultra-lean combustion with a stable ignition by making the combustion room stratified. Also, it has the advantage of both low environmental pollution that lean premixed combustion realizes and high efficiency which diffusive combustion enables.

In partially premixed combustion, flame propagates in non-uniform mixture. Therefore, the flames are expected to behave different from the case that it propagates in homogeneous mixture. For example, flame accelerates and decelerates suddenly. Flame instability is caused by them. Detailed knowledge about the partial premixed combustion has not been explained so far. However understandings of more fundamental characteristics are necessary for the optimization of it.

In this report, we examined the behavior of flame propagation in ethane(C_2H_6)-air mixture which has concentration gradient in a direction in a glass tube. We cleared the effect of concentration gradient on the burning velocity in the mixture. As a result, for a mixture of an identical local equivalence ratio, flame propagation velocity increases with increasing concentration gradient. Rich or lean flammable limit in concentration gradient are extended.

EXPERIMENTAL STUDY OF BIOMASS COMBUSTION IN A FIX BED COMBUSTION SYSTEM

ADI SURJOSATYO
Fakultas Teknik Universitas Indonesia
Kampus Baru U.I. Depok, Indonesia

FARID NASIR ANI
Fakulti Kejuruteraan Mekanikal
Universiti Teknologi Malaysia
Skudai Johor DT, Malaysia

Abstract:

The current gasifier has a maximum heat capacity of 15.02 kW, used to gasify biomass (oil palm shells) produces low calorific gas burn through a low calorific tube gas burner. These tube-gas burners consist of: a). A single burner with a tube length of 140 mm and ∅ 110mm, b). A single burner with a tube length of 140 mm and ∅ 83 mm, c). A compound or coaxial tubes with 140 and 170 mm length, respectively; ∅110 and 50 mm respectively. The experimental shows that maximum heat release of the gas burner is 5.8 kW at equivalence ratio of 1.21 with the gas flow rate of 1.04 g/hr. The burner with the arrangement (c) has contributed the lowest CO emission level of 140 ppm, while the burner with the arrangement (b) produced the lowest NO_x of 108 ppm. Maximum measured temperature was achieved at 675 °C when the compound burner (c) was used.

A STUDY ON CONDENSATION JET BY USING LLS AND WAVELETS MULTIRESOLUTION

KIMURA MOTOAKI, HODOYA KOHEI, TAKEI MASAHIRO,
VIEROW KAREN, SAITO YOSHIFURU, HORII KIYOSHI and
SAIMA ATUSHI
Department of Mechanical Engineering, College of Science and Technology
Nihon University, Tokyo, Japan
E-mail: kimura@mech.cst.nihon-u.ac.jp

Abstract:

There are complex phenomena with high shear layer, heat transfer and phase change around condensation jets. This experimental study aims at investigating the diffusion process of condensation jets. Cold dry air is discharged from a round nozzle of 10mm in diameter into the high humidity air environment in order to form condensation jets. LDV is used as the forward-scattering mode for velocity measurement, particle number counting and sizing. For temperature measurement, a fine thermocouple is used. And laser light sheet method is used for visualization of condensation jets and image processing. From the measurement of the particle number concentration, the amount particle increase and spreads toward surroundings as the humidity rises. The mean velocity and fluctuating velocity decrease as the increase of condensed particle. The characteristics of condensation jets are denoted from the measurement results. The more following analysis was tried. A new method to analyze condensation jet has been launched to extract the feature from the condensation jet's image captured by laser light sheet using discrete wavelets transform. The mean image (sum of Level 0 and Level 1) from wavelets multiresolution agrees to the mean temperature distribution quantitatively. Also, the fluctuation image (sum of over Level 2) indicates the mean temperature boundary of the temperature distribution on the cross section. That is because the wavelets level extracts the physical feature image. Submerging a cold dry air into a saturated vapor atmosphere generates the condensation jet. A

mixing due to entrainment occurs at the submerging area, which results in the supersaturating condition.

COMBUSTION ENCHANCEMENT BY THERMO-ACOUSTIC STREAMING

M. TANABE
Department of Aerospace Engineering
College of Science and Technology Nihon University,
Tokyo, Japan
T. FUJIMORI
Research Institute IHI co., Ltd., Tokyo, Japan
M. KONO
Department of Aeronautics and Astronautics
Faculty of engineering, University of Tokyo, Tokyo, Japan

Abstract:

The interaction between combustion and acoustic oscillation a new type of convection that is named as thermo-acoustic streaming. The mechanism of the streaming is analyzed and experimental investigations are made to evaluate its influence on burning rate. Since natural convention has characteristics very similar to the streaming, microgravity conditions were used to suppress it. Streaming patterns are identified from the flame shape and burning rates are measured for various acoustic frequency and SPL and the location of the burning fuel droplet. As a result, the hypothesis that the streaming is driven by acoustic radiation force is validated. Burning enhancement is explained through enhanced convective transfer in the presence of the thermo-acoustic streaming.

COCONUT BIO-FUEL, AN ENERGY RESOURCE IN THE FUTURE: EXPLORING THE PROSPECTS OF CME, A VIABLE ALTERNATIVE TO FOSSIL FUELS IN THE PHILIPPINES

PERLA S. ROXAS
Technological University of the Philippines
Manila

Abstract:

Like most countries in the world solely dependent on imported fuel oils, the Philippines is at the crossroads on accelerating its industrialization efforts to be able to compete in a 21st scenario of globalization and free market economy. Such economic activity will translate into an increase demand for energy and power at a time of rising prices of crude oil and levies on petroleum. Add to this is a threat on depleting supply from the countries currently embroiled in border conflicts.

In the Philippines the price of crude oil is a major driving force in the economy as the production, generation and more importantly the transport of goods and services are energy and power intensive. Any slight change in fuel prices leads to a domino effect on prices of goods and commodities and triggers an immediate reaction from the people and society as a whole. Should the event be one of a drastic decline if not a cut in the supply of crude oil, imagine a scenario of a standstill in most of the country's engine of growth.

The search for alternative fuel resources has been the subject of research for several years and led to the discovery of biogas, alco-diesel, compressed natural gas, and recently fuel cells. All of them underwent tests and have their unique properties and characteristics as fuels. But burning the fuel and transforming the heat energy to useful work is only one side of the picture, as other issues have surfaced such as the demand for clean air, effects of the fuel on engine material, the water by products, the combustion quality, and the volume and space occupancy in the vehicle body.

This paper is all about the emergence of coconut bio-fuel viz. the use of CME, coconut methyl ester as a viable fuel alternative. It shall present the early developments, the characteristics and performance of CME as a fuel and its prospects to be commercially viable considering that the Philippines is a coconut producing country. What makes the prospects of CME very promising is the abundance of the resource and the hope that it will address not only the price and supply issue but for the Philippines, it can be the viable fuel of the future should fossil oil deposits run dry.

AN EXPERIMENTAL STUDY OF THE INFLUENCE OF FUEL TEMPERATURE ON COMBUSTION AND IGNITION CHARACTERISTICS OF COMPRESSION IGNITION ENGINE

MASARU KUBOTA, KOJI YOSHIDA, HIDEO SHOJI
and MORIMASA HIGAKI
Department of Mechanical Engineering,
College of Science and Technology Nihon University,
Tokyo, Japan
E-mail: kubo@st.mech.cst.nihon-u.ac.jp

Abstract:

The purpose of this study is to improve the engine performance and the exhaust gas emission characteristics of the diesel engine. To activate the fuel before the ignition can improve the ignition and combustion feature. The heated fuels were provided to the diesel engine and the influence of the fuel temperature on engine performance was made clear. Two test fuels which had different boiling points were used.

The test engine is a four-stroke, single-cylinder, direct fuel injection, diesel engine. The cooling system is forced-air cooling and the displacement volume is 211 [cm3]. The compression ratio is about 19.9:1. Two test fuels: the normal diesel fuel and cetane, are selected, because the cetane has the high boiling point (570 [K]).

The experiments were made under constant engine speed of 3000 [rpm]. When the normal diesel fuel was injected, nine values of mass flow rate of fuel injection were selected from 0.064 [g/s] to 0.186 [g/s]. A mass flow rate of fuel injection: 0.178 [g/s] was only examined for the cetane. For each mass flow rate of fuel, the fuel temperature was increased from 373 [K] to 673 [K] at 50 [K] intervals. The fuel temperature of normal operation was between 310 [K] and 330 [K].

For both normal diesel fuel and cetane, crank angles at ignition and maximum combustion pressure are delayed and the maximum combustion pressure is decreased as the fuel temperature rises. Especially, in the case of cetane, when the fuel temperature is higher than 573 [K], the ignition delay is enlarged. In cases of large and middle mass flow rate of fuel

injection, the brake thermal efficiency is decreased when the fuel temperature is higher than 573 [K]. However, in the case of small mass flow rate of fuel injection, the brake thermal efficiency is almost independent of fuel temperature. In the case of normal diesel fuel, brake mean effective presser is almost constant regardless of fuel temperature. However, in the case of cetane, brake mean effective presser is remarkably decreased when the fuel temperature is higher than the boiling point. HC and CO concentrations in the exhaust gas emission show constant values regardless of fuel temperature. However, NOx concentration is gradually decreased as the fuel temperature rises. Especially, in the case of cetane, when the fuel temperature is 673 [K], NOx concentration is less than 60 [%] of the operation with normal fuel temperature.

EFFECT OF COMPRESSION RATIOS ON ENGINE PERFORMANCE AND EMISSIONS OF A CNG FUELLED ENGINE

MARDANI ALI SERA and ROSLI ABU BAKAR
Fakulti Kejuruteraan Mekanikal Universiti Teknologi Malaysia
Skudai Johor Darul Ta'zim, Malaysia
E-mail: mardani@hotmail.com and rosliab@fkm.utm.my

Abstract:

Compressed Natural Gas (CNG) has been one of the most widely researched fuels proposed to replace liquid petroleum based fuels. The use of CNG fuel has proven potential to reduce emissions compared to conventionally fuelled engine. CNG has a research octane value approximately 130 which allows an engine to operate at a higher compression ratio. CNG also has an excellent lean flammability limit allowing for lean burn operation which reduces production of carbon monoxide (CO) and oxide of nitrogen (NO_x) in the exhaust and raises thermal efficiency at part load. However, the main problem to commercialise the CNG engine was the lack of engine performance. The CNG engine, either in dual-fuel, bi-fuel or dedicated forms are lower performance compare to that of gasoline. One option to increase the CNG fuelled engine is to increase the compression ratio. In this study, the one cylinder research engine is connected with the CNG conversion kit to run the CNG fuelled engine. The pressure transducer, crank encoder and exhaust gas analyser were installed with the data acquisition system to record the engine and emissions data. The experiment were done for various speeds and compression ratios. The results showed that the fuel CNG engine produced higher cylinder pressures and torque for higher compression ratios and at the same time maintaining the lower exhaust emissions.

A STUDY ON THE DIFFUSIVE COMBUSTION INDUCED BY HIGH VOLTAGE ELECTRICAL DISCHARGE

T.TOMIZAWA, K. YOSHIDA and H. SHOJI
Department of Mechanical Engineering,
College of Science and Technology Nihon University,
Tokyo, Japan
E-mail: t_tommy@syd.odn.ne.jp
H. TANAKA
Department of Physics, The National Defense Academy,
Kanagawa, Japan

Abstract:

A new concept of diffusive combustion which is using the characteristic of plasma jet ignition is proposed. Methanol is charged in the cavity of injector and the air charged in the combustion chamber. The methanol is ejected and is ignited by the high voltage electrical discharge and the diffusive combustion occurs. The injector configuration and the ratio of methanol volume to cavity volume influence not only the diffusive combustion process but also the maximum combustion pressure. In cases of small orifice diameter, the diffusive combustion is not recognized, and the maximum combustion pressure increases as the orifice area becomes large. In the case of a little fuel is provided in the cavity, the diffusive combustion does not occur and in the case where the most cavity is filled with methanol, the fuel mist is only ejected. In the case of appropriate methanol is supplied, the diffusive combustion certainly occurs.

COOLANT TEMPERATURE EFFECT ON GASOLINE ENGINE FUEL CONSUMPTION

SRITHAR A/L RAJOO, ALIAS MOHD. NOOR, ROSLI ABU BAKAR
Faculty of Mechanical Engineering
Universiti Teknologi Malaysia
Malaysia
srithar@fkm.utm.my

Abstract:

This paper presents the study conducted to evaluate the coolant temperature effect on gasoline engine particularly the fuel consumption. Recent researches in automotive field have been concentrated on alternative fuel due to the fact that crude petroleum oil is becoming scarce. Apart from this, it is equally essential to study into currently available engines and improvise it to reduce fuel consumption. In this effort, an engine used in Malaysian made cars was tested under different coolant temperature and its corresponding fuel performance was recorded. In order to manually alter the coolant temperature, an independent cooling tower was built to be attached to the test engine via hose connection. It was found that, when coolant temperature increased from 70°C to 100°C, the fuel consumption of the engine decreases gradually and stabilizes after 90°C.

THE COMBUSTION PHENOMENA UNDER CORONA DISCHARGE APPLICATION IN A VESSEL

TERUKI KADONO, KOJI YOSHIDA, HIDEO SHOJI
Department of Mechanical Engineering,
College of Science and Technology Nihon University,
Tokyo, Japan
E -mail: Terukikadono@aol.com

Abstract:

The purpose of this study is to examine the relationship between corona discharge application and the

combustion phenomena. The feature of flame propagation under the condition with the positive or negative corona discharge was investigated by using a constant volume vessel. A homogeneous propane-air mixture was used for a combustion experiment and six equivalence ratios between 0.7 and 1.5 were tested. For generating the positive and negative corona discharge, a non-uniform electric field was applied to the combustion chamber by the needle to plane gap. The needle-shaped electrode was located at the ceiling of the combustion chamber, and the plane electrode was attached to the bottom. Positive or negative DC high voltage was imposed on the needle-shaped electrode and the plane electrode was grounded. To make clear the influence of the corona discharge condition, the number of needle-shape electrode was varied, and one or five electrodes were attempted. The positive or negative DC high voltage was varied from 0 to ±30.0 [kV] or until the spark-over occurred. The maximum combustion pressure and the burning period were analyzed from the combustion pressure records. The flame propagation process was visualized by a conventional Z-shaped schlieren system and was recorded by a high-speed camera. The flame front area was also measured on the schlieren photographs by using the image processing system.

When the positive corona discharge was applied, the luminescence from corona with five-electrode was weak as compared with that of one-electrode. When the negative corona discharge was applied, the luminescence from corona and combustion were not affected by number of electrode. In the case of five-electrode, the frame front area was increasing immediately after the ignition since the flame was affected by electric field in the early stage of combustion. In the case of one-electrode, the frame front area was significantly increasing at about 12[ms] after the ignition because the flame front reached the streamer corona area. For both positive and negative corona discharge, the combustion was improved as the input voltage increased. In the case of negative corona discharge, the index of combustion was not affected by number of electrode. When the positive corona discharge was applied by low voltage, the combustion was improved in the case of one-electrode as compared with that of five-electrode, but the index of combustion with one-electrode was almost equal to that of five-electrode when the high voltage was applied.

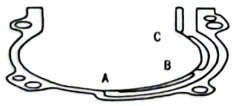


Fig.1 Scavenging passage entrances

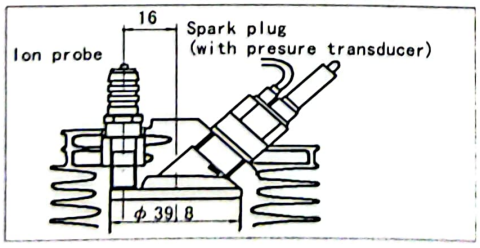


Fig.2 Locations of crystal pressure transducer and

Small type VGJ is flush mounted on the wall located at x=0

INPUT POWER EFFECTS ON THE TEMPERATURE-TIME CHARACTERISTICS OF DOMESTIC REFRIGERATORS USING R-134a REFRIGERANT

RICARTE C. NUÑEZ and JUAN A ITURRALDE
Western Institute of Technology, La Paz
Iloilo City, Philippines

Refrigerating systems or refrigerators, like other mechanical equipment are known to emit ozone-depleting substances into the atmosphere. The gases emitted from these equipment reach the ozone layer, allowing incoming harmful radiation to enter the atmosphere and destroy the layer posing threats to human lives. Refrigerant 134a is an ozone-friendly substance recommended by refrigerator manufacturers replacing the traditional refrigerant R12. This results to lessening the depletion problems in the ozone layer. In this work, a domestic refrigerator using R134a as its refrigerant is operated. Two additional compressors, aside from the refrigerator's own compressor are connected in parallel with each other, thus, becoming part of the whole system. For each trial test, the temperatures were taken from each of the following refrigerator compartments: freezer, middle and vegetable compartments, using one specific compressor at a time. The purpose of this experiment is to obtain actual temperature-time plot for each of the compressors and to know the corresponding temperature cooling behavior in each compartment. Experimental results from these tests showed the usual exponential temperature behavior during the cooling of refrigerating substances, the individual compartment temperature cooling behavior, their similarities and differences with varying input powers. The generated characteristic curves (Temp-Time) are deemed useful in the design of a more optimized domestic refrigerators using an ozone-friendly refrigerant like R134a and the possibility of employing this refrigerant to R12-based domestic refrigerators.

AN EXPERIMENTAL STUDY OF THE EFFECT OF A SMALL-PULSE JET ARRAY ON THE VELOCITY PROFILE OF A CHANNEL FLOE FOR THE FRICTION DRAG REDUCTION

N. MIYAGI, A. NOZAKI, Y. IWADARE, Y. MATSUZAWA, H. FUJITA, H. SHOJI, M. KIMURA
Department of Mechanical Engineering,
College of Science and Technology Nihon University,
Tokyo, Japan
E-mail: miyagi@st.mech.cst.nihon-u.ac.jp

Abstract:

A small type Vortex Generator Jet (VGJ) in a turbulent boundary layer is investigated to reduce fluid drags. This paper describes the characteristics of the velocity profiles in a turbulent channel flow influenced by a pulsed Jet array. A mm in the fully developed channel flow. A loud speaker that is driven by a since wave drives the VGJ. Three jet angles and three jet velocities are tried. The velocity is measured by the hot-wire anemometer, and the signal of the hot-wire anemometer synchronized with the sine wave is digitised by the AD board on the PC. The flow data are analysed by the time averaging and phase averaging. The velocity signal profiles are analysed to obtain three statistical parameters, average velocity, turbulence intensity and skewness

factor. The iso-velocity contours by the phase averaging show the motion of the vortices as follows. At x=5mm the generated by the VGJ become fully developed in the form of discrete spanwise lines array and the vortices stay near the wall. At x=5mm (downstream from the VGJ array position), the average velocity profile is slower, and the turbulence intensity is higher due to the vortices generated by the VGJ. The turbulence is suppressed near the wall. Thus, the velocity near the wall becomes slow and less turbulent, which is expected to contribute to the fluid drag reduction.

ROBOTICS, DYNAMICS AND BIOMECHANICS

SYNTHESIS OF ROBUST LANE-FOLLOWING CONTROL SYSTEM USING STOCHASTIC PARAMETER TUNING

AKIYOSHI KOBAYASHI and SHINICHIRO HORIUCHI
College of Science and Technology, Nihon University
Tokyo, Japan

Abstract:

In the research field of Intelligent Transport System, a number of steering controllers have been proposed to automate the lateral guidance and control of motor vehicles. These controllers were developed under following assumptions:

Perfect measurement assumption, i.e., exact information on all state variables including yaw rate, side slip angle, steering actuator positions are available.

Linear-deterministic model assumption, i.e., vehicle dynamics is described by linear deterministic model and its parameters are known in design phase.

In reality, these assumptions are not satisfied because vital information on vehicle motion are not available, and vehicle dynamics is inherently nonlinear and it is difficult to express real uncertainty in deterministic form.

To meet these problems, this paper proposes a new design method of the automatic steering control system based on Generalized Predictive Control (GPC) theory and Stochastic Robustness Synthesis (SRS). This control system has following features.

By using polynomial design approach for the GPC controller, full state feedback that give rise to the difficulty in measuring the state variables can be avoided.

SRS approach is applicable to nonlinear vehicle model and makes possible to take into account vehicle parameter variations in stochastic way.

First, this paper describes the model of vehicle dynamics and road kinematics used for the control system design. Then the paper discusses the structure of the control system determined based on GPC theory.

Next, tuning of design parameters of the GPC controller and coefficients of an observer polynomial using SRS is considered. In this approach, performances of control system such as robust stability, tracking performance, control efficiency are characterized by the probability of instability and probability of violation of performance criteria. Then the design cost function is defined as a weighted quadratic sum of these probabilities. The design parameters of the controller that minimize the probabilistic cost function are determined by using Genetic Algorithm.

Finally, a series of simulations are carried out to clarify the performance of the control system. The results verify that the proposed control system is valuable one to the automatic lane tracking system.

OPTIMIZATION OF VEHICLE TRAJECTORIES FOR EMERGENCY OBSTACLE AVOIDANCE

RYUSUKE HIRAO and SHINICHIRO HORIUCHI
College of Science and Technology, Nihon University
Tokyo, Japan
E-mail: horiuchi.cst.nihon-u.ac.jp

Abstract:

The safety of the road traffic process has become more and more a social and important issue in recent years. As far as safety problems are concerned, the importance of obstacle avoidance maneuver is obvious. In the field of Automated Highway System, the problem of obstacle avoidance was analyzed by an optimal control approach using the Pontryagin Principle. However, the relationship between vehicle dynamics and optimal obstacle avoidance maneuver has not been clarified. The present study is dealing with computation of optimal vehicle trajectories for emergency obstacle avoidance situation. The vehicle trajectory problem can be formulated as an optimal control problem that finds the solution that minimize an objective function and satisfies both boundary condition and path constraints. The theory for direct optimization is applied to the computation of the optimal trajectories.

First, this paper describes the vehicle model used in the study. This model considers nonlinear tire characteristics of combined lateral and longitudinal slip, time lag for tire forces, dynamics of steering actuator, and effects of roll steer and compliance steer. The inputs to the vehicle model are steering wheel angle and braking command.

Second, the optimization procedure is described concretely. In this paper, "direct optimization" method is used. In this method, the optimal control problem is converted to parameter optimization problem and it is solved using an existing nonlinear programming code. The primary advantage of this method is that it is much easier to extend to general problems involving path constraints, discontinuous input, and control inequality. Moreover this method makes possible to determine not only the optimal control but also the optimal design parameters.

Finally, optimization results for emergency obstacle avoidance maneuvers are presented. The optimizations are made for several conditions. Effects of four-wheel steering, front/rear braking force distribution ratio, and roll stiffness distribution ratio on obstacle avoidance maneuvers are discussed. The results indicate that the simultaneous optimization of front/rear braking force distribution ratio and roll stiffness distribution ratio is very effective to improve the stability of vehicles at emergency situations.

STOCHASTIC ROBUSTNESS SYNTHESIS OF NONLINEAR VEHICLE DYNAMICS CONTROLLER

MASATSUGU NISHIMURA And SHINICHIRO HORIUCHI
Department of Mechanical Engineering,
College of Science and Technology Nihon University,

Tokyo, Japan
E-mail: horiuchi.cst.nihon-u.ac.jp

Abstract:

Stochastic Robustness Synthesis (SRS), a simple numerical technique for designing robust controller is applied to vehicle steering control system. The system robustness is characterized by the cost function that is the weighted quadratic sum of stochastic robustness metrics. These metrics probability of instability, probability of violation of performance criteria are estimated using Monte Carlo evaluation. The design parameters of the controller for Four-Wheel Steering (4WS) vehicle are determined so as to minimize the cost function. Comparisons between conventional 4WS controller and optimized controller indicate that the SRS controller has good robust performance.

RE-DESIGN OF INDUSTRIAL BEVERAGE CRATE WASING MACHINE

EDWIN J. CALILUNG
Department of Mechanical Engineering
College of Engineering

Abstract:

The study investigated and optimized the important parameters affecting the cleaning performance of beverage crate washing machines. These included soaking parameters of temperature, soak duration, liquid agitation and use of detergent. It also included spray washing parameters of spray pressure, duration, impingement angle and nozzle diameter. The criteria used for evaluating the cleaning performance as affected by the various parameters is the degree of dirt removal which was indirectly measured by comparing the luminance of before and after digital images of test surfaces of the beverage crate.

A test set-up consisting of a soaking tank and spray section with crate conveyor was designed and fabricated. A digital imaging setup for taking digital photos of the test crates under consistent lighting conditions was designed and fabricated. In order to have uniform starting levels of dirt on the test crates, artificial dirt was applied consisting of fine charcoal dust mixed with an adhesive agent such as sugar syrup and water-based glue. Digital photos of pre-marked areas before and after washing treatment are taken and analyzed for average luminance. The net change is luminance is computed which corresponds to the level of dirt removed.

Results showed that the soaking process itself removed substantial amounts of dirt and that this dirt removal can be enhanced by high soaking bath temperature, increased duration of soaking and turbulent agitation of the soaking bath. Maximum change in luminance level was achieved at soaking temperature of 70°C, soak duration of 45 seconds, and high level of agitation.

Similarly, dirt removal during the spray washing process is improved by increasing spray pressure and duration. Changing the nozzle diameter and spray impingement angle showed minimal effects on cleaning performance. The best cleaning performance was achieved at the highest pressure setting tested, that of 3 bar, largest nozzle diameter of 6mm, spray duration of 2.75 seconds and impingement angle of 90°C.

The best overall cleaning performance was achieved by combining soaking and spraying treatments, wherein the crates were pre-soaked at a minimum soaking treatment of 25 seconds duration at 30°C soak bath temperature and no agitation, before the spray washing treatment. At this condition the best cleaning result was obtained at the lowest pressure setting of 3 bar of 90°C.

Based on the test results the following design recommendations were suggested:

- Crate washer design should include both soaking and spray washing sections to ensure optimum cleaning of surface adhered dirt,
- The soaking tank should be sized that crates are soaked for a minimum duration of 25 seconds at the rated speed of the washer.
- Only minimal heating and agitation of the soaking bath is needed for good cleaning performance, however, for sanitation purposes the soaking must be heated to at least 60°C,
- Spray pressure should at least be 1 bar while spray duration must be increased to at least 5.3 seconds by increasing the number of nozzles.

DISCUSSION ON THE ROTATIONAL MOTION OF A FLEXIBLE BODY (THE FIRST REPORT: DEFINITION OF THE ANGULAR ROTATIONAL MOTION)

ATSUSHI MITAMURA, TETSU NISHIMURA
And KOUICHI MIURA
Department of Mechanical Engineering,
College of Science and Technology, Nihon University
Tokyo, Japan
KAYO KAWAMURA
Toppan Printing Co. Ltd.
Tokyo, Japan

Abstract:

If we know the mass distribution of the body, we can easily resolve the center of gravity of a flexible body and then the translation motion of the center of gravity. However, the angular rotation cannot be derived directly from the current configuration of a flexible body. If the angular rotational motion of a flexible body is defined from the current deformed configuration, we can grasp the integrated motion of the whole flexible body as the translational motion of the center of gravity and the angular motion around the center of gravity. Authors interest in such a rotational motion of a flexible body or structure.

Here the flexible body is defined as a structure, which is able to deform by not only external forces but also actuators installed in the structure. The configuration of the structure varies largely, that is, the center of gravity and the inertia moment tend to change according to the motion of structure. Since the translational motion of the center of gravity and the rotational motion about the center of gravity are induced by the external agency, the whole behavior of the structure can be estimated without considering the effect of installed actuators.

When the structure, which is supported on the ground, is deformed by the installed actuators, if we can observe the translational and the rotational motion about the center of gravity,

the external force such as the reaction force at the supporting portion may be estimated.

In this paper, the rotational motion of flexible body can be defined concretely with using the instantaneous angular velocity, which is introduced from the total angular momentum. The total angular momentum is defined by the sum of the angular momentum on the each element of the flexible structure.

This concept can be applied to the motion analysis of a self-deforming structure, such as a manipulator and a human body. The application of this method will be mentioned afterward in the second paper of this study in order to verify the advantageousness of the suggested method.

DEFINITION OF THE ANGULAR ROTATIONAL MOTION (THE 2nd REPORT: ON KINEMATICS ANALYSIS OF A SHOT PUT MOTION)

TAKAYUKI KATSUGARI, YUUHEI WADA and TETSU NISHIMURA
Department of Mechanical Engineering,
College of Science and Technology, Nihon University
Tokyo, Japan
KAYO KAWAMURA
Toppan Printing Co. Ltd.
Tokyo, Japan
E-mail: nishimu@mech.cst.nihon-u.ac.jp

Abstract:

The main theme of this research is to analyze a throwing motion of shot put on mechanical standpoint. The throwing distance on shot put can be improved not only by muscular strength and physique but also by the throwing skill. Then, the mechanical analysis of motion, by observing the displacement, velocity and acceleration of each element in a body, is effective in order to promote the record. On analyzing a human body motion, a human body is usually replaced by a link system, if small distortion in the human joints is permissible to neglect. The two kinds of throwing style are well known as the shot put motion. They are the revolutionary shot put and the glide shot put, so called O'Brien method. Before analyzing the throwing motions, it is required that the angular rotational motion of flexible structures such as a human body should be defined strictly, since each throwing motion of shot put is inevitably accompanied by rotational motion. And also, it must be noted that the angular rotational motion varies its magnitude and orientation with time. The definition of angular motion will be mentioned in detail in the first paper of this study. Hence, the application of the concept of angular rotational motion is mainly mentioned in this paper.

In this study, the actual throwing motions by two subjects, who are Japanese domestic top-level athletes, were observed by high-speed video cameras. One is a national record holder who performs a revolutionary throwing method, and the other is a high school record holder who performs O'Brien throwing method. Here, the human body is replaced by the link system composed of 15 elements, and the 19 connecting joints so as to clear the throwing motion. In order to obtain the three-dimensional images of the shot put motion from the obtained vide pictures, the DLT method is applied on data processing. The detailed description about the DLT method will be shown in the paper. However, since the obtained data have inevitable error, the velocity data, which are derived by the divided difference of the displacement data, includes large error. Then the smoothing operation by Fourier expansion is adopted in this study. Finally, the acceleration and velocity of each joint and also the angular rotational motion of the subject can be derived. It is expected that the obtained knowledge will be contribute to innovating the effective throwing motion.

WORK SPACE FOR A FREE-FLOATING VARIABLE GEOMETRY TRUSS

KOHICHI MIURA
Department of Mechanical Engineering
College of Science and Technology, Nihon University
Tokyo, Japan
E-mail: miura@mech.cst.nihon-u.ac.jp
HUANG SHENGYANG
Nippon Unisoft, Co., Ltd

M.C. NATORI
Space Structures Lab., Institute of Space and Astronautical Science

TETSU NISHIMURA
Department of Mechanical Engineering
College of Science and Technology, Nihon University
Tokyo, Japan
E-mail: nishimu@mech.cst.nihon-u.ac.jp

Abstract:

The workspace concerning a free-floating variable geometry truss is discussed. The basic equations for Kinematics of variable geometry truss are derived, and utilizing these formulations, the algorithm of researching a workspace of a free-floating variable geometry truss is expressed. In order to examine their validity and explore the practical availability of such a structure in the coming space construction or the various applications, a work space characteristic is discussed in this paper.

CONTROL OF UNICYCLE ROBOT BY MULTI DIMENSIONAL FUZZY RULES

UKIYA KAZUTAKA, SEKINE TARO and OKANO MICHIHARU
Department of Mechanical Engineering
College of Science and Technology, Nihon University
Tokyo, Japan
E-mail: k-ukiya@palette.plala.or.jp

Abstract:

This report describes of "the control of analysis of unicycle" by using unicycle robot model that the author suggested. The author study with the intention of explaining how human can ride a unicycle well. So in this study, we took notice of motions. They are pedaling and steering. The machine model, which observed was manufactured to these two points, and it has actually examined whether this control method is suitable.

Although a certain amount of control result was able to be obtained in control of only the fixed direction, establishment of control theory is not made of the model which freed Pitch and Roll yet. Then author made a unicycle robot by using fuzzy control theory, which can apply the knowledge to which it comes from experience of man to control.

Moreover, required steering torque changes with speed. Then, the author created the three-dimension fuzzy rule which determines the amount of operations to the drive from a pitch angle, Pitch angular velocity, and wheel rotation angular velocity, and determines the amount of operations to steering from a Roll angle, Roll angular velocity, and body speed. The author also conducts the experiment by the fuzzy rule which does not take the influence by speed into consideration, compares both, and examines the effective control method.

THREE DIMENSIONAL MEASUREMENT OF MICRO SHAPES

TAKAZO YAMADA, NOBORU TAKITA
and HWA-SOO LEE
Department of Mechanical Engineering
College of Science and Technology, Nihon University
Tokyo, Japan
E-mail: lee@mech.cst.nihon-u.ac.jp

Abstract:

In grinding operation, geometrical shapes of grinding wheel surfaces are directly copied to machined workpieces. And then, in order to obtain workpieces with high quality, the surfaces of grinding wheels have to be generated and monitored precisely before carrying out the machining process. From such a viewpoint, this study aims to monitor and evaluate the three dimensional shapes of grinding wheel surfaces precisely. At the first step of this study, a basic concept to monitor the three dimensional shapes is proposed. In this method, using a laser displacement sensor, three dimensional geometrical shapes in micron order are evaluated. At the result of trial measurements, it is confirmed that the micro shapes can be monitored quantitatively, the basic concept of the present method will be reported.

ENGINEERING EDUCATION

THE SCADA SYSTEM OF WESTERN VISAYAS COLLEGE OF SCIENCE AND TECHNOLOGY

GODELYN G. HISOLE and STEPHEN M. HISOLE
Integrated Institute of Electrical Engineers, Iloilo Chapter
La Paz, Iloilo City, Philippines, 5000

Abstract:

Supervisory Control and Data Acquisition (SCADA) System is commonly used in modernized industries in the Philippines to maximize the efficiency and operation of both machines and manpower. Human-Machine Interface (HMI) is being utilized as an aid to communicate machines and the systems. Production, transmission, and distribution of power systems require cost effective and reliable SCADA systems not only for operations purposes but also for measurement, historical analysis, forecasting, billing, modeling, and strategic planning.

The SCADA systems shall replace the traditional operation of electrical power systems of Western Visayas College of Science and Technology (WVCST) in Iloilo City, to primarily maximize the efficiency of the power systems through a controlled energy loss which will result to quality distributions of energy in the electrical power network. It can produce updated data of energy consumed by the institution. It is cost effective as compared to conventional electrical power system accounting since energy usage is controlled and preprogrammed with respect to time of availability, leading to less electrical power losses. The system also gives security to the other systems and safety to the facilities, people, hardware and related systems. On top of these, a system in a school environment provides faculty and students to actualize SCADA systems operation in real industry situation.

Picking up appropriate SCADA systems requires five key steps to consider: (1) fact finding; (2) using appropriate standards; (3) managing appropriate procurement; (4) establishing measurable track performance; and (5) establishing manufacturer and application supports.

INCORPORATING CONTROLS IN ME: THE DLSU EXPERIENCE

ALVIN Y. CHUA
Mechanical Engineering Department
De La Salle University
Manila, Philippines

Abstract:

This paper presents a discussion on how the course on controls was introduced into the Mechanical Engineering Curriculum in De La Salle University-Manila to enhance its mechatronics program. An introduction of mechatronics is done with focus on a specific area of importance that is on controls with its applications. The different curriculums of other universities were analyzed to be made as basis for the incorporation of controls to the ME curriculum. Researches in the field of controls done by student and faculty of the ME Department are also explained to shown its importance in solving industry related problems. Finally, conclusions and future recommendation will be proposed to further improve the learning of controls in ME.

TECHNOPRENEURSHIP:REENGINEERING ENGINEERING EDUCATION

AIDA LICAROS-VELASCO
Department of Business Management
College of Business and Economics
De La Salle University, Manila, Philippines

Abstract:

This paper presents a conceptual model on how engineering programs can address the current needs of the knowledge economy in the light of globalization and the liberalization of the profession. The engineering profession can

be made more competitive in the light of new developments in the economy and in the roles universities are presently assuming. There is need to train engineers who will have the skills of being innovative and economically value adding individuals. These capabilities will lead them to be entrepreneurs. This concept hopes to address the issue of bridging the creation of real opportunities for technical products that are focused on customers' needs and the new role being undertaken by the universities of the new millennium.

MECHATRONICS CONCENTRATION IN THE MECHANICAL ENGINEERING PROGRAM AT DE LA SALLE UNIVERSITY – MANILA

MANUEL C. BELINO, JOHANN ERIK GONZALEZ, LAURENCE GAN LIM, ALVIN CHUA
And EDWIN CALILUNG
Mechanical Engineering Department
De La Salle University – Manila

Abstract:

This article discusses the development of a Bachelor of Science in Mechanical Engineering (B.S.M.E.) with a concentration in mechatronics engineering at De La Salle University (DLSU) – Manila. The innovative curriculum introduces mechatronics concepts as early as the freshman year, integrates mechatronics principles and applications in various courses and culminates in a mechatronics design project or a thesis project in the final year. While the new curriculum is primarily designed to prepare the students for a global practice of mechanical engineering, it also considers the requirements of the Philippine government licensure examination. This paper also presents the mechatronics option in the mechanical engineering graduate programs offered in the university such as the Master of Science (M.S.), Master of Engineering Program (M.E.P.), and Doctor of Philosophy (Ph.D.).

STRENGTH OF MATERIALS AND MATERIALS SCIENCE

STRESS ANALYSIS OF ADHESIVE JOINTS USING MESHLESS METHOD

TOMOYUKI SAITO, NOBORU TOMIOKA, AKIFUMI OKABE
College of Science & Technology, Nihon University
Kanda-Surugadai, Chiyoda-ku, Tokyo, Japan
E-mail: m052013@edu.cst.nihon-u.ac.jp

Abstract:

The method of applying the EFGM (Element Free Galerkin Method) developed by T. Belytschko et al. to the analysis of adhesive joints was proposed, and the stresses on the interface were analyzed in the three-dimension. The adhesive joint composed of two adherends and adhesive layer is divided into three analytical domains. EFGM is applied to each analytical domain. Displacements on the boundary between adjoining analytical domains, that is, the interfaces must be continuity. This continuous condition has been achieved by the penalty method in the total potential energy. An analytical result showed that the stress and displacement had the characteristic of dissimilar.

ELECTRO-MAGNETIC INDUCTION CHARACTERISTICS OF REINFORCING BARS BURIED IN CONCRETE

OSAMU YOKOTA
Department of Mechanical Engineering, College of Engineering,
Nihon University, Koriyama, Japan
E-mail: yokota@mech.ce.nihon-u.ac.jp

Abstract:

The research has been studied to find the accuracy with which the dimensions and positions of the reinforcing bars can be measured quantitatively by electromagnetic Induction method. This paper describes the trial manufactures of various types of probe coils and investigation of reinforcing bars buried in concrete structures with various changes of the test frequencies.

As a result, it was found that Lissajous pattern was influenced by various materials, shapes and diameters of reinforcing bars, covering depth (distance between probe coil and reinforcing bar), test frequencies probe coils and so on. In this case where the reinforcing bar was of similar quality and the same diameter, the covering depth influenced the amplitude of the Lissajous pattern. When the covering depth was constant, it was obvious that the similar quality bars with different diameters had an effect on the phase angle and the amplitude of the Lissajous pattern.

STRESS ANALYSIS OF SPOT WELDED JOINTS USING ELEMENT FREE GALERKIN METHOD

KAZUHIRO KAMEI, SHINICHI IKEDA, NOBORU TOMIOKA and AKIFUMI OKABE
College of Science and Technology, Nihon University,
Tokyo, Japan

Abstract:

At the design stage of the automobile body structure, it is demanded to evaluate fatigue strength in the spot weld adequately. Detailed element division is necessary to improve the solution of the stress around the spot weld by the finite element method. This division work to three dimension model is a process where the most troublesome operation is needed.

In this paper, the Element Free Galerkin Method (EFGM) which was the most typical meshless method was applied to the stress analysis of the spot welded joints, and an elastic stress of three dimensions was analyzed. An analytical model is joints which overlap two flat plates, and connect it by the spot welding. The stress analysis of the spot welded joints by EFGM was conducted as follows. First, two plates of the spot-welded joints are separated on the joint surface. Secondarily, EFGM was applied to the analysis of each plate. Thirdly, the joint surface of the spot welded joints was considered to be an interface of two plates and the displacements of each plate on the interface is made to be equal each other and the stress was analyzed. Finally, the excellent stress distribution around the spot welding was able to be obtained by the above-mentioned method.

THE TENSILE STRENGTH OF CRYOGENICALLY PROCESSED PITCH COPPER

LORETO G. AGUILA
Integrated Research and Training Center
Technological University of the Philippines
Manila, Philippines

ALLAN RHEY M. MALIBIRAN, CHARLIE B. MENDOZA, EIMAN A. BERSABE, LUCIO E. MANIQUIS III, JEREMY EMIL S. CULANG and REYNOULD M. VALINO
College of Engineering
Technological University of the Philippines
Manila, Philippines

Abstract:

The tensile strength of pitch copper, containing about 99.99% Cu was measured to determine the effect of cryogenic processing or cryogenic treatment on the mechanical property of copper. Standard samples were subjected to two dry cryogenic treatments, Process 300 and Process 500. In these two processes, the samples were slowly cooled to –300 °F and held at this low temperature for 12 hours, after which, they are slowly heated to room temperature. Ramp down and ramp up times took 2 hours each. The materials were then tempered at different temper times of 2, 4 and 6 hours. Temper ramp up and ramp down times took 3 hours each. In Process 300, the material was slowly reheated to 300 °F, while in Process 500, the material was reheated to 500 °F after having undergone Process 300 at 2-hour temper time. The results of the experiments show that cryogenic treatment does not improve the mechanical property of pitch of copper. In Process 300, both the tensile strength and the yield strength decreased when subjected to longer temper time of 6 hours. The effect of 6 hours of temper under Process 300 is the same as that observed when the material is subjected to Process 500 at any temper time. Pitch copper not subjected to cryogenic treatment has tensile strength of 289.6 MPa, yield strength of 287.3 MPa and elongation of 4.562 mm equivalent to strain of 18.25 %. When subjected to Process 300, the average tensile strength is 266.3 MPa, yield strength of 207.4 Mpa, and elongation of 8.7 mm (strain of 34.7 %.). When subjected to Process 500, the average tensile strength is 232.2 MPa, yield strength of 84.5 Mpa and elongation of 14.8 mm (strain of 59.3 %). These suggest that pitch copper softens when treated cryogenically.

THERMO-ELASTRO-PLASTIC ANALYSIS OF A THIN PLATE SUBJECTED THE LASER IRRADATION (RE-YIELDING CONDITION FRO THE SECOND IRRADATION)

T. OUCHI and Y. KATO
Department of Mechanical Engineering
College of Science and Technology, Nihon University
Tokyo, Japan

Abstract:

In this paper a research program fro investigating the elasto-plastic behavior when a laser beam was irradiated to the surface of a thin metal plate with cooling its backside is described. When the plate is cooled down until the room temperature after the first irradiation, the residual deformation occurs and the residual stress distributes over the plate. Then the distributions of internal forces become very complicated, and the conditions fro re-yielding under the second irradiation will closely depend on the position of re-irradiation. Therefore, when the second irradiation is performed at the adjacent position of the first irradiation, how the deformational behavior is related with the distance of irradiation interval is especially discussed. Moreover we investigate the distributions of internal forces that can be obtained by the changes of position irradiation, and then clarify the relations between the irradiation interval and the re-yielding time or time re-yielding temperature.

CORROSION RESISTANCE OF CRYOGENICALLY TREATED PITCH COPPER

LORETO G. AGUILA
Integrated Research and Training Center
Technological University of the Philippines
Manila, Philippines

ALLAN RHEY M. MALIBIRAN, CHARLIE B. MENDOZA, EIMAN A. BERSABE, LUCIO E. MANIQUIS III, JEREMY EMIL S. CULANG and RAYNOULD M. VALINO
College of Engineering
Technological University of the Philippines
Manila, Philippines

Abstract:

The corrosion rate of pitch copper, containing about 99.99% Cu was measured to determine the effect of cryogenic processing or cryogenic treatment on the chemical property of copper. Copper rods, 12.7 mm in diameter were subjected to two cryogenic treatments, Process 300 and Process 500. In these two processes, the samples were slowly cooled to –300 °F and held at this low temperature for 12 hours, after which, they were slowly heated to room temperature. Ramp down and ramp up times took two hours each. The material was then tempered. Temper ramp up and ramp down times took 12 hours each. In Process 300, the material was slowly reheated to 300 °F, while in Process 500, the material was reheated to 500 °F. The materials were subjected to different temper soak times of 2, 4 and 6 hours. The results of the experiments show that neither the Process nor temper time significantly affect the corrosion resistance of cryogenically treated pitch copper, the computed f values being only 3.3272 for the Process, and 14.6714 for temper time. Temper time is significant at $\alpha = 0.10$ level. The study further shows that the initial effect of the treatment is to make the material less corrosion resistant, and as temper time increases, so does corrosion resistance. The corrosion rate of untreated material is 15.07 µm/h. The corrosion rate of pitch copper subjected to Process 300 is 17.56, 15.26 and 11.48 µm/h for temper time of 2, 4 and 6 hours, respectively. The corrosion rate of samples subjected to Process 500 is 17.45, 17.21 and 13.81 µm/h for temper time of 2, 4 and 6 hours, respectively.

DEFORMATIONAL BEHAVIOR OF PLASTIC HINGE IN A CIRCULAR PLATE AND ELASTIC ANALYSIS CONSIDERING LARGE DEFLECTION

T. NAKAGAWA, Y. KATO
Department of Mechanical Engineering
College of Science and Technology, Nihon University, Tokyo, Japan

Abstract

In the conventional limit analysis, it is supposed that the circumferential plastic hinge line is formed at the same position in a plate. However, there would be a contradiction in this assumption and it is necessary to re-examine the hypothesis used in the conventional limit analysis. Because, from our previous experiments, it has been confirmed that the plastic hinge line spreads gradually. The elastic analysis under the constrained support conditions both inner and outer peripherally, which bending moment and membrane force act at the same time, is described in this paper. Especially, as the preliminary step for considering the model of numerical analysis, the finite deformation analysis will be compared with an infinitesimal one, and we investigate how those results influence the model of the plastic analysis.

THE EFFECT OF CRYOGENIC PROCESSING ON THE ELECTRICAL CONDUCTIVITY OF PITCH COPPER

LORETO G. AGUILA
Integrated Research and Training Center
Technological University of the Philippines
Manila, Philippines

ALLAN RHEY M. MALIBIRAN, CHARLIE B. MENDOZA, EIMAN A. BERSABE, LUCIO E. MANIQUIS III, JEREMY EMIL S. CULANG and RAYNOULD M. VALINO
College of Engineering
Technological University of the Philippines
Manila, Philippines

Abstract

The electrical resistance of pitch copper, containing about 99.99% Cu was measured to determine the effect of cryogenic processing or cryogenic treatment on the electrical property of copper. Rods 120 mm in length and 12.7 mm in diameter were subjected to two cryogenic treatments, Process 300 and Process 500. In these two processes, the samples were slowly cooled to −300 °F and held at this low temperature for 12 hours, after which, it is slowly heated to room temperature. Ramp down and ramp up times took two hours each. The material was then tempered. Temper ramp up and ramp down times also took 12 hours each. In Process 300, the material was slowly reheated to 300 °F, while in Process 500, the material was reheated to 500 °F. The materials are subjected to different temper soak times of 2, 4 and 6 hours. The study shows that a minor improvement in the electrical conductivity of pitch copper can result from cryogenic treatment. The improvement is equivalent to 4.1 % for Process 300, and to 3.9 % for Process 500. This was arrived at from the calculated electrical resistances of 129.8 Ω/km for Process 300, 130.18 Ω/km for Process 500, as compared to that for "as is" material measured at 135.4 Ω/km. The improvement in electrical conductivity, however, was not proven significant statistically.

TORSIONAL ANALYSIS OF FUNCTIONALLY GRADED MATERIALS

TETSU NISHIMURA, MASAHITO UEDA and TAKASHI SAKATE
Department of Mechanical Engineering,
College of Science and Technology,
Nihon University, Tokyo, Japan
E-mail: nishimu@mech.cst.nihon-u.ac.jp

Abstract:

Recently, composite materials such as Functionally Graded Materials (FGMs) have been developing as the future materials. One of the FGMs is realized by mixing non-metal particles with the metal and sintering these together. Selecting the compound substances and changing their mixing ratio, we can get any character of material i.e. the new progressive material which has a required character of strength or flexibility and the chemical resistance according to actual applications.

The mean diameter of the compound particles in the sintered material is almost the order of several micrometers. If we observe microscopically, the sintered material is composed of so many particles which have some contact points each other. Therefore the sintered material contains a lot of voids, and the percentage of the voids depends on the density of the whole body. In other wards the sintered material is a random lattice structure. The theoretical analysis of a random lattice structure is not completely studied yet.

Especially on the FGMs, the mixing ratio is varied over the cross section of a body so as to get the required function for actual use. However there is no theoretical method to evaluate the mechanical rigidity of a cross section over which the mechanical property varies. The general theory of torsion on a prismatic bar is developed by using the analogy of the soap film inflation. But it is only applicable for a bar which has the property of uniform shear modulus over its cross section.

Although the mechanical property of FGMs is estimated experimentally up to the present, it is required to evaluate theoretically the property to supply new materials which are suited for specific structures. The aim of this paper is to develop the general theory of torsion applicable for the FGMs.

SPECTRALLY SELECTIVE THIN-FILM COATING FOR FLAT-PLATE COLLECTOR

REYNALDO C. MULI
Mechanical Engineering Department
Don Bosco Technical College
Manila, Philippines

ALVIN B. CULABA
Mechanical Engineering Department
De La Salle University
Manila, Philippines

IVAN B. CULABA
Department of Physics
Ateneo De Manila University
Manila, Philippines

Abstract

A spectrally selective antireflection optical thin-film coating to reduce the reflectance of glass cover of a solar flat-plate collector was designed and fabricated. The antireflection coating was applied on the incident surface of a 3 mm thick clear glass, commonly used in flat-plate collectors. The transmittance of solar radiation of ≈89% of clear glass increased to ≈92% on the entire visible light range of the spectrum. Consequently, the collector efficiency of the flat-plate collector also increased by 3%. The design focused on the optical properties of glass and the interference of light waves to alter the optical characteristics of glass to a preferred value on a selected spectrum. Fabrication was done using the high-vacuum system technology.

BAUSCHINGER EFFECT ON THE STRAIN HARDENING REGION

TAKAO NAKAMURA AND TETSU NISHIMURA
Department of Mechanical Engineering
College of Science and Technology, Nihon University, Tokyo, Japan
takao@mech.cst.nihon-u.ac.jp
nishimu@mech.cst.nihon-u.ac.jp

Abstract

The plastic flow rule is one of the most important matters in the plastic analysis. It is generally believed that a proceeding direction of plastic strain is normal to the yield surface. It is called the normal flow rule. However there is little experimental verification for the normal flow rule. Hence authors study the plastic flow rule experimentally. The experimental results show that the plastic strain precedes parallel to the radial direction on the yield surface, that is, the radial flow rule. Authors investigate also the proceeding direction of plastic strain on the strain hardening region. Since the configuration of the yield surface varies according to the strain hardening, it is required to clear the deformed configuration of the yield surface. And also, it is required to investigate the Bauschinger effect, because the non-linear behavior similar to the strain hardening is recognized. In this paper, the non-linear behavior by Bauschinger effect is mentioned.

EFFECT OF ANNEALING TREATMENT ON CUBIC BORON NITRIDE COATED ON STEEL SUBSTRATE

E.HAMZAH, R.D.RAMDAN, V.C.VENKATESH and N.H.B. HAMID
Faculty of Mechanical Engineering
Universiti Teknologi Malaysia
Johor, Malaysia

Abstract

Applications of cubic boron nitride (cBN) as coating material has not been used extensively due to its poor adhesion to the substrate. High stress level in the film is considered to be the main factor for the delamination of cBN films after deposition. Thus the purpose of this work is to introduce an annealing treatment in order to reduce the stresses developed during deposition of cBN on the substrate. The annealing treatment conducted was at 700 K and 923 K on cBN film coated on high speed steel substrate. Structure and stress analysis of the films was carried out using XRD and FTIR method which shows that annealing treatment on cBN films transformed the amorphous unannealead layers to more crystalline-like structure. This transformation seems to reduce the stresses and enhance the adhesion properties of cBN film.

ANALYSIS OF ELASTO – PLASTIC BUCKLING OF A PRSMATIC SHELL COLUMN

Y. TAKAYAMA, K. KUROKI AND T. NISHIMURA
Department of Mechanical Engineering
College of Science and Technology, Nihon University, Tokyo, Japan
E-mail:takayama@st.mech.cst.nihon-u.ac.jp
kuroki@st.mech.cst.nihon-u.ac.jp
nishimu@mech.cst.nihon-u.ac.jp

T. YAMADA
Honda Motor Co, First research
E-mail: ta-yamada@t.rd.honda.co.jp

Abstract

Recently, automobiles are the most useful and indispensable products in our life. But, contrary to the benefits, a great number of people are injured or killed by automobile accidents every year. Therefore, it is strongly demanded to ensure against the risks of automobile accidents. The intensity of the crush energy is enormous so that an engine block penetrates into the cabin to injure the driver and passengers. Hence the prismatic shell structures are installed at the back of the front bumper so as to absorb the crush energy. However, there is no exact analysis of the crush mechanism, although numerical calculation has been done. The numerical calculation occasionally gives an inadequate result, that is, the rack of the reliability and also takes too much cost. The aim of this paper is to clear the buckling phenomena of the shell columns and to contribute to the actual design of the structures.

AN INNOVATIVE APPROACH IN SOLVING PHASE DIAGRAM PROBLEMS IN PLAIN CARBON STEELS USING MS VISUAL C++ COMPUTER PROGRAM

RICARTE C. NUÑEZ, RYAN A. SUBONG, and JUAN A. ITURRALDE
College of Engineering, Western Institute of Technology
La Paz, Iloilo City, Philippines

Abstract

A computer program output specifically intended to solve phase diagram problems in plain carbon steel is introduced. A prerequisite step in the generation of computer program known as the determination of x-y (Composition-Temperature) coordinates manually obtained from the available phase diagram and needed in the curve fitting process has been employed. Appropriate polynomial curve fitting procedures were done in order to determine polynomial constants needed in the formulation of equations having r^2 coefficient of 0.99. The computer program generates a Composition-Temperature plot for the plain carbon steel based on input data entered such as

the mass of each component or composition of one component and temperature of the alloy. A screen output of the program also shows the relative amounts of each phase involved, the different phases, input data entered, computed values of various properties of the phase diagram and a sketch of the microstructure of the alloy. This computer program may be used as an educational visual aid/tool for classroom settings and other related applications. It is also an alternative way to acquire answers to problems in phase diagram other than the traditional graphical and computational method. The flowchart and algorithm of the program using MS Visual C++ is also presented.

ELASTO – PLASTIC RESPONSE OF A BAR BY AN OSCILLATORY BENDING MOMENT AND TWISTING MOMENT

MASAHIRO NAKAMOTO AND TETSU NISHIMURA
Department of Mechanical Engineering
College of Science and Technology, Nihon University, Tokyo, Japan
E-mail: nakamoto@st.mech.cst.nihon-u.ac.jp
E-mail: nishimu@mech.cst.nihon-u.ac.jp

NAOTO KAYAMA
Hitachi Co. Ltd, Tokyo, Japan
E-mail: naoto-kayama@wing.zero.ad.jp

Abstract:

Elasto-plastic dynamic response of a bar structure, which is subjected to a sinusoidal external agency, is discussed. The previous study shows that, although plastic deformation is induced in a beam in the transient stage, the elastic oscillatory motion is recovered in the steady state under the certain condition. This fact is useful for saving a cost, because a small amount of plastic deformation may be permissible for some kind of structures, if it does not cause a serious damage. As the external agency exceeds a certain limit, the internal forces agree with the yield condition to produce a plastic hinge, that is, plastic phase. Then, on the actual structural analysis, the elasto-plastic behavior should be discussed. In this paper, a dynamic response of a bar structure, which is subjected to the harmonic bending and twisting moment simultaneously, is investigated. The methods of resolving the pure elastic limit and the natural frequency in plastic phase are mentioned.

FLUID MECHANICS

CT IMAGE RECONSTRUCTION USING SAMPLE PATTERN MATCHING METHOD & ITS APPLICATION TO MULTIPHASE FLOW

MASAHIRO TAKEI, MITSUAKI OCHI, YOSHIFURU SAITO And KIYOSHI HORII
Department of Mechanical Engineering, College of Science and Technology, Nihon University
E-mail:takei@mech.cst.nihon-u.ac.jp

Abstract

A new reconstruction method, which is called sample pattern mating method, has been applied to an ill-posed inverse problem of a capacitance-computed tomography for solid air two-phase flow. As a result, the accuracy of the reconstructed image is improved, and the images are stable during the iterative calculation as compared with a conventional Newton-Rampson iterative method. Moreover, the particles volume ratio in solid air tow phase flow calculated from this method is more accurate than the conventional method.

The relation between capacitance matrix **C** and the permittivity distributions **E** in the solid air pipeline is expressed by $\mathbf{C}= \mathbf{S_e}\mathbf{E}$. The capacitance CT has a method to obtain the permittivity distribution of the particles **E** on the cross section from both known sensitivity map matrix $\mathbf{S_e}$ and the measured capacitance matrix **C**. In the case of 12 electrodes and 32×32=1024 meshes on a pipeline cross section, the sensitivity map $\mathbf{S_e}$ is a 66×1024 matrix, the capacitance matrix **C** expresses a 66×1 matrix, and the permittivity distribution matrix **E** is a 1024×1 matrix. The mathematical method to obtain the permittivity matrix **E** from the capacitance matrix **C** and the sensitivity map matrix **Se** are ill posed inverse problem because the inverse matrix $\mathbf{S_e}^{-1}$ does not exist. A specific mathematical method to be suitable for this capacitance CT has been needed because generally, an inverse problem depends on the system equation.

Basically, sampled pattern mating method is an iterative method; however, it is approved that the solution is stable during the iterative calculation. The relation between k-th iterative solution $\mathbf{E'}^{(k)}$ and (k-1)-th iterative solution $\mathbf{E'}^{(k-1)}$ is

$$\mathbf{E'}^{(k)} = \mathbf{E'}^{(k-1)} + \mathbf{Se'}^{T}\,\Delta\mathbf{C'}^{(k-1)} = \mathbf{Se'}^{T}\,\mathbf{C'} + \left[\mathbf{I_m} - \frac{\mathbf{Se'}^{T}\,\mathbf{Se'}}{\left|\mathbf{Se'}\,\mathbf{E'}^{(k-1)}\right|}\right]\mathbf{E'}^{(k-1)} \tag{1}$$

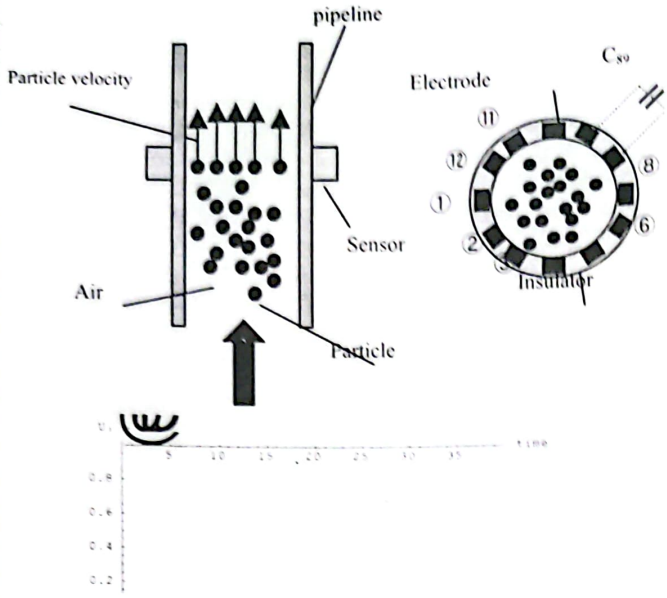
where, $\mathbf{Se}^{T}$ is transpose matrix of **Se**, $\mathbf{I_m}$ is a unit matrix. The evaluation function of k-th iterative solution $\mathbf{E}^{(k)}$: $\mathbf{F}[\mathbf{E}^{(k)}]$ is

$$1-\mathbf{F}[\mathbf{E}^{(k)}] = 1-\frac{\mathbf{C}}{|\mathbf{C}|}\frac{\mathbf{SeE}^{(k)}}{\left|\mathbf{SeE}^{(k)}\right|} = 1-\mathbf{C'}\frac{\mathbf{Se'E'}^{(k)}}{\left|\mathbf{Se'E'}^{(k)}\right|} \tag{2}$$

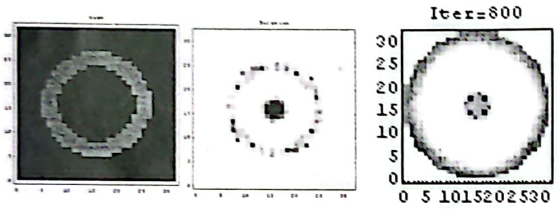
where, prime ' is normalization, | | is the norm. This method is to obtain $\mathbf{E}^{(k)}$ when the above evaluation function becomes one. The state transition matrix **T** between k-th iterative solution $\mathbf{E'}^{(k)}$ and (k-1)-th iterative solution $\mathbf{E'}^{(k-1)}$ is

$$\mathbf{T} = \mathbf{I_m} - \frac{\mathbf{Se'}^{T}\,\mathbf{Se'}}{\left|\mathbf{Se'}\,\mathbf{E'}^{(k-1)}\right|} = \frac{\mathbf{Se'}^{T}\,\mathbf{Se'}}{\left|\mathbf{C'}^{(k-1)}\right|}. \tag{3}$$

When assuming that $\mathbf{E'}^{(k-1)}$ is equal to the eigen value of the state transition matrix **T**: λ, $\mathbf{T}\,\mathbf{E'}^{(k-1)} = \lambda\mathbf{C'}^{(k-1)}$, and $\mathbf{E'}^{(k)} = \left(\lambda^{k} + \lambda^{k-1} + \lambda + \mathbf{I_m}\right)\mathbf{E'}^{(0)}$. Because the maximum eigen value of the state transition matrix **T**: λ_{max} is less than one. Eq.(1) gives the accurate and stable solution in the case of $k \to \infty$.



(A)Phantom image (B)SPM method (C)Newton- Rampson method
Fig. Comparison (A)Front view (B) Cross section
Fig. Capacitance CT



PARTICLE DENSITY EVALUATION IN TWO PHASE FLOW USING STATE TRANSITION MATRIX

YOSHIHITO TSUTSUMI
Department of Mechanical Engineering, College of Science and Technology, Nihon University
E-mail: tsutsumi@st.mech.cst.nihon-u.ac.jp

Abstract

This study evaluates particle density distribution image in a pipe cross section by means of state transition matrix that is a parameter to indicate dominant change between CT 2D space-time frames. It is clarified to suggest a linear or a non-linear of particle density change in the time and space. The Density distributions of solid-air two phase flow with a time-space change in a pipe is measured. The time change of the particle density distribution as a real time image using the capacitance CT is visualized.

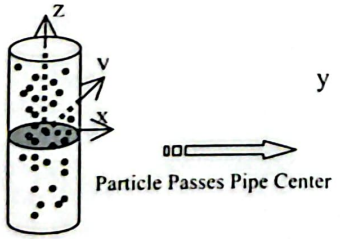


Fig.1 Particle Passes Measurement Cross Section

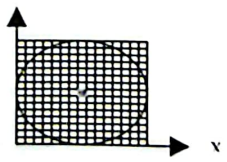


Fig.2 Measured Particle Density

Fig.3 Time Change of Particle Density

State Transition Matrix

$$\Lambda = -\frac{1}{\Delta t} ln \left[\frac{U_{i+1} - U_{i+2}}{U_i - U_{i+1}} \right]$$

DEVELOPMENT OF A NEW HOT-WIRE ANEMOMETRY FOR MEASURING A THIN BOUNDARY-LAYER FLOW

M. MINATO and A. MATSUMOTO
Department of Mechanical Engineering
College of Science and Technology, Nihon University, Tokyo, Japan
E-mail: matumoto@mech.cst.nihon-u.ac.jp

Abstract:

We manufactured the new hot-wire anemometer with two parallel wires placed close together for measuring a transitional boundary layer flow. The main feature of this probe is much smaller than another multi-sensor probes existed, such as a x-type probe, in vertical size. Thus we can regard this probe as a sensor similar in configuration to a single normal probe. Hence, we expect to obtain the high spatial resolution for the fluctuating velocities. The principle of measurement is very simple such that stream wise and normal wise-component are obtained simultaneously from the addition and the subtraction of output voltage of two hot wires with aid of the look-up matrix method. As a result, we found that though hot-wire output characteristics against the change in flow direction are more complicated, we can compensate them easily and utilize this anemometer with high efficiency in a thin boundary layer.

MODEL EXPERIMENT ON MICRO-PRESSURE WAVE RADIATED FROM TUNNEL EXIT WITH HOOD

S. NAGAI
Department of Mechanical Engineering
College of Science and Technology, Nihon University, Tokyo, Japan

M. IIDA
Railway Technical Research Institute, Tokyo, Japan

H. FUJITA
Department of Mechanical Engineering
College of Science and Technology, Nihon University, Tokyo, Japan

Abstract:

The effect of the hood installed at the tunnel exit to the radiated micro-pressure wave is studied experimentally for 3 different exit conditions, without hood, with simple hood and hood with a window. The main component of the frequency of the micro-pressure wave in the model test is less than 2 kHz,

corresponding to the infrasonic region in real train. The decay of the micro-pressure wave obeys well known inverse law with the distance in most of the cases. The Effect of the radiated wave directly from the window is observed in the window side of the hood as well as the diffraction of the wave to the opposite side is found.

ESTABLISHMENT OF A CENTER FOR MICRO-HYDRO TECHNOLOGIES AT DE LA SALLE UNIVERSITY-MANILA: ISSUES AND CONCERNS

GODOFREDO C. SALAZAR
Mechanical Engineering Department
College of Engineering
De La Salle University-Manila

Abstract:

Until recently, new and renewable energy sources such as micro- and mini-hydro power in the Philippines are becoming viable sources of power generation, particularly for small isolated communities. The initial investment might look big, but the long term benefit to the community and to the environment (e.g., greenhouse gas emissions reduction) will outweigh the investment. Once electricity is distributed and managed by the local communities, downstream industries can be established, bringing in much needed development for the community.

A proposal for the establishment of a Center for Micro-hydro Technologies at De La Salle University-Manila which aims to help the Department of Energy in accelerating the development of micro-hydropower in the country was recently submitted to an appropriate foreign funding agency. The highlights of the proposal including issues and concerns on the establishment of such center are discussed in this paper.

MEASUREMENT AND CONTROL

DEVELOMENT OF A LIGHT WEIGHT MASTICATION MOTION MEASUREMENT DEVICE WITH MECHANICAL LINK

N. KAWAHATA, H. YOSHIDA And R. SAKAI
Department of Precision Machinery Engineering
College of Science and Technology, Nihon University, Tokyo, Japan
E-mail: kawahata@eme.cst.nihon-u.ac.jp
T. SAITOH
Nihon Molex
I. NAKAJIMA And M. KIKUCHI
School of Dentistry, Nihon University

Abstract:

We have developed a 6 degrees of freedom motion simulator to repeatedly visualize human mastication motion under the collaboration with the school of dentistry of Nihon University. Existing devices to measure the complicated motion of mastication are normally fixed base type of large scale, and require heavy load for patients or examinees, so that the devices are not so popular for dentists. Among of those, the department of pediatric dentistry of the school has developed a small and light load device to measure mastication motion by utilizing magnetic field. However, it is quite costly and the some problems in its accuracy and reliability. Our newly developed system is of pure mechanical and serial link type, so that it is simple, light (less than 90 grams), quite accurate, stable and cheap.

A 3-DIMENSIONAL POSITION AND ATTITUDE MEASUREMENT SENSOR USING PSD AND 4LED'S ON THE APICES OF A TETRAHEDRON

N. KAWAHATA, H. YOSHIDA and M. KINOSHITA
Department of Mechanical Engineering
College of Science and Technology, Nihon University,
Funabashi, Japan
E-mail: kawahata@eme.cst.nihon-u.ac.jp

Abstract:

"PSD" (Position Sensing Device) camera is based on a semiconductor to sense a position of bright spot on an image plane of the camera. It is know that the position and the attitude of a little plate can be calculated from pictures of more than 4 specific spots on the plate. Normally, 4 LED's arranged at the comers of a square is photographed by a PSD camera. The PSD outputs are often so noisy that the position and the attitude of the plate turn out to be lack of accuracy. It is required to reduce those noises themselves and also the computational sensitivity to PSD read out. For the latter, the 4 LED's are installed not on a two-dimensional plane but on the 4 apices of a tetrahedron attached on the plane, so that the sensitivity could be reduced and the accuracy could be improved. The sensitivities of cases where 4 LED's are installed at the corners of square and at the apices of a tetrahedron are compared.

MEASUREMENT METHOD OF POSTURE AND MOVEMENT FOR HUMAN USING AN ACCELEROMETER

T. SUGIMOTO
Department of Mechanical Engineering
College of Science and Technology, Nihon University,
Funabashi, Japan
E-mail: sugimoto@eme.cst.nihon-u.ac.jp
Y. KOJIMA
Department of Medical and Welfare Engineering
School of Science and Technology, Nihon University, Tokyo, Japan
E-mail: position@eme.cst.nihon-u.ac.jp

Abstract:

The measurement of Human posture and movement has been studied using a dual axis accelerometer. This study is useful supporting the independently living for the aged or weak person in order to keep safety, healthy and high quality of life for the person for monitoring of human movement in daily activities. In previously the measurement methods for posture and movement of our living activities had studied, but it is required that various kind of measurement for posture and movement in activities for the aged or weak person. An accelerometer with dual axis is installed on the integrated IC chip has been applied in this study. The detective dual axis, one is sensitive to the

direction to gravity and another is right angle to gravity. The accelerometer is held on the ilium on examiner, have measured the inclination angle for accelerometer direction to gravity and its values deviation progressing time. The result give us a simple measurement method are clarified that the position of sitting down, lying down on face, back and sideways in stationary statuses and walking, running, walking to going up and down on the stairs in moving statuses. This study will give contribution to expand activities for aged person.

NONLINEAR TRACKING CONTROL LAW FOR A LUNAR LANDER

AKIO ABE, KENJI UCHIYAMA and YUZO SHIMADA
Department of Aerospace Engineering
College of Science and Technology, Nihon University, Chiba, Japan
E-mail: abeaero@hotmail.com

Abstract:

In a lunar landing mission, it is required to transport a landing module certainly and safety on the lunar surface. Some demands on this mission are to have robustness against various disturbances and to achieve vertical soft landing at the pre-assigned point and so on. This paper presents a nonlinear tracking control law for the lunar lander. In order to guarantee a vertical landing on the lunar surface, the authors employ the gravity-turn descent in which thrust vector is parallel to the its velocity vector. Proposed control law can be applied to nonlinear motion of gravity-turn descent. The gain adjustment law derived by the Lyapunov direct method is expressed as the from of differential equations. Computer simulations are performed to verify the validity of the proposed control law. This control law has a fast convergence with respect to altitude and velocity errors and robustness against thruster partial failure.

DESIGN OF OPTIMAL GUIDANCE AND TRACKING CONTROL FOR A SPACECRAFT

KENJI UCHIYAMA and YUZO SHIMADA
Department of Mechanical Engineering
College of Science and Technology, Nihon University, Funabashi, Japan
E-mail: uchiyama@aero.cst.nihon-u.ac.jp

Abstract:

A design of optimal guidance and tracking control for a spacecraft is proposed in order to guarantee minimum fuel consumption and to have robustness against various. The control system is designed to track the reference profiles. Which are analytically derived by the optimal guidance law to minimize the fuel consumption for the mission. An adjustment law in the tracking controller based on the Lyapunov direct method is given in the form of the differential equations with respect to the controller's variable gains. It is applied to the control of the lunar landing module in this paper. The results of the numerical simulation show that the proposed guidance and control law achieves a vertical and soft landing on the lunar surface and has higher robustness against disturbances in the thruster failure mode.

EFFECTIVE PRESENTATION METHOD OF INFORMATION TO DRIVER-EXPERIMENT CONSIDERATION OF DRIVER BEHAVIOR PART1

T. NISHIYAMA, T. SEKINE and M. OKANO
Department of Aerospace Engineering
College of Science and Technology, Nihon University, Chiba, Japan
E-mail: YIU50086@nifty.com

Abstract:

Recently ITS is developing and spreading. A driver can acquire much information during driving. In order to tell many information to a driver exactly and safety, examination of the effective information presentation method is needed. The purpose of this report is to gather and analyzed the characteristics of driver's using the car navigation system under a usual urban driving. In addition, it considers the difference of the driver's behavior between the route guidance by the passenger's voice and the route guidance by the computer sound. Consideration was performed from gaze action and the mental workload of a driver.

THE EFFECT OF AN INFORMATION PRESENTATION METHOD TO DRIVER BEHAVIOR-EXPERIMENTAL CONSIDEARTION PART2

T. NAGATSUKA, T. NISHIYAMA, TSEKINE and M. OKANO
Department of Mechanical Engineering
College of Science and Technology, Nihon University, Tokyo, Japan
E-mail: takashi.nagatsuka@nifty.com

Abstract:

With more and more people taking to the roads these days, concerns over traffic congestion, vehicle accidents and environmental damage are on the rise. There are various solutions to these problems. One promising solution is ITS (Intelligent Transport System). There has been much progress in recent years with this technology and it holds great expectations for future use. ITS can offer information and services which have not been available until now. In order to provide a system that can offer information to a driver safety and effectively, it is necessary to examine the effects of such information on a driver. Research for obtaining the basic data necessary the influence that such information systems has on drivers involved examining the influence of the in-vehicle display. This was achieved by using a simple simulator imitating public city roads. The motive for using the simulator was that the testing could be done repeatedly in a safe environment, therefore eliminating and threat of danger to the driver. Also, because of the difficulties of positioning a display in an actual modern day vehicle, it was more convenient to use the simulator. Finally, the simulator allowed for exploration into the possibilities of new kinds of information presentation methods, which were not possible in the real environment. This paper explores how changing the position

of the monitor and the number of displayed characters present influence the driver's eye motion and ECG (electrocardiogram). This paper proposes that the information presented to the driver should be less than 30 characters and the driver's active field of view.

FUNDAMENTAL ANALYSIS TOWARD FOUR WHEEL INTEGRATED CONTROL VEHICLES

T. TAKANASHI, T. SEKINE and M. OKANO
Department of Mechanical Engineering
College of Science and Technology, Nihon University, Tokyo, Japan
E-mail: pixy@gb4.so-net.ne.jp

Abstract:

Structural restrictions from power train systems and steering system lessen by realization of wheel-in motor, it is possible that independent wheel drive, brake and steer, Then, an improvement of safety margin as vehicles is excepted by uniformity of tire load rate. In this paper, tire load rate in cornering performance is calculated at two wheel steering, four wheel steering and others, it inquired possibility in Integrated Wheel Steering System.

EXPERIMENTAL STUDY ON DRIVE'S CHARCTERISTIC WITH INTENSIVE AND DISPERSIVE DISPLAY UNITS TO OFFER INFORMATION

T. SEKINE, K. KAWAKAMI, M. ARAI and OKANO
Department of Mechanical Engineering
College of Science and Technology, Nihon University, Tokyo, Japan
E-mail: sekine@mech.cst.nihon-u.ac.jp

Abstract:

The examinations were implemented by two presentation methods which are 'Dispersive Display' and 'Intensive Display'. The peculiarities of each were examined by the reaction time of gazes, the complete time of the operation and the percentage of correct operation. The experimental result shows the indicating position as 'Dispersive Display' has a meaning of additional information. 'Dispersive Display' with multi auditory information, in addition, improves the reaction time of gazes, the operation time and the percentages of correct operation of sub task.

GENETIC ALGORITHM CONTROLLER FOR HIGHLY NONLINEAR SYSTEM

ELMER P. DADIOS and PATRICK S. FERNANDEZ
Department of Manufacturing engineering and Management
De La Salle University, Manila
dadiose@dlsu.edu.ph or elmerdadios@yahoo.com

Abstract

This paper presents genetic algorithm controller to control a highly non-linear system. The Flexible Pole-Cart Balancing Problem (FPCBP) is used as the benchmark to investigate the capability of the Genetic Algorithm (GA). The controller software is initially trained using a set of data taken from an actual run of the real physical Flexible Pole Cart Balancing System (FPCBS). The trained GA-based controller then controls the FPCBS on its own. The architecture and learning behavior of the GA-based controller is discussed. Experiment results show that the controller developed is adaptive, accurate, and robust.

ENVIRONMENTAL ENGINEERING WASTE MANAGEMENT

A FEASIBILITY STUDY ON THE USE OF BLENDED FUEL FOR DIESEL ENGINES (CASE OF METHYL-ESTERIFIED WASTE EDIBLE OIL AND KEROSENE)

H. TAKEDA, K. TAKEDA, T. SHIBUYA, G. ISHIKAWA, S. MORIYA, I. TANASAW
Department of Mechanical Engineering
College of Science and Technology, Nihon University, Tokyo, Japan
E-mail: moriya@mech.ce.nihon-u.ac.jp

Abstract:

Biomass is expected to be one of the energy resources renewable in a short period. Especially, methyl-esterified waste edible oil (methyl ester) attracts attention as an alternative fuel for diesel engines. We mixed kerosene with the methyl ester in order to improve the lower calorific value, kinematic viscosity and pour point. When the blended fuel was used in a real engine, the smoke scale was decreased considerably when compared with the gas oil and the simple methyl ester. This paper has made clear the fundamental characteristics (ignition time, ignition temperature, kinematic viscosity, surface tension and lower calorific value) and the engine performance of the blended fuel.

AN ATTEMPT TO USE WASTE EDIBLE OIL-KEROSENE MIXTURE IN DIESEL ENGINE (CHANGE OF CHARACTERISTICS BY HEATING)

K. TAKEDA, H. TAKEDA, S. MORIYA and I. TANASAW
Department of Mechanical Engineering
College of Science and Technology, Nihon University, Tokyo, Japan
E-mail: moriya@mech.ce.nihon-u.ac.jp

Abstract:

A feasibility study was made on the use of the waste edible oil used for cooking as an alternative fuel for diesel engines. If the waste edible oil is proved to be of use in diesel engines, the consumption of the fossil fuel would be reduced. In the experiment described in this paper, kerosene was mixed with the waste edible oil in order to improve some of the characteristics of the vegetables oil. The mixing ratios were varied from20 to 80% in volume. The lower calorific value, density, surface tension and kinematic viscosity of the waste

edible oil-kerosene mixture were measured. It was found that the mixing of kerosene improved the thermophysical properties of the waste edible oil. In addition, the ignition temperature and the ignition lag were measured and found to be improved by mixing kerosene more than 60% in volume with the waste edible oil. Finally the waste edible oil-kerosene mixture was burned in a conventional 273-cc diesel engine. Although the thermal efficiency was a little lower, the smoke scale in the exhaust gas was confirmed to be almost the same level as the gas oil.

LIFE-CYCLE ENVIRONMENTAL BENEFITS OF USING BIOTHANOL AS A GASOLINE ADDITIVE

RAYMOND R. TAN and ALVIN B. CULABA
Chemical Engineering Department
Mechanical Engineering Department

Abstract:

Ethanol can be blended with gasoline as a fuel extender, an oxygenating agent, and octane enhancer. Blends containing up to 10% ethanol by volume (E10) can be used in unmodified spark-ignition engines without significant changes in vehicle performance, while yielding reductions in over-all tailpipe emissions. Enzyme-based processing technology is expected to allow ethanol to be produced commercially from cellulosic biomass such as municipal and agricultural waste as early as 2005.Ethyl alcohol produced in this manner is called bioethanol; this production technology promises to be an effective open-loop recycling ("waste-to-energy") pathway which simultaneously gives significant benefits of reduced fossil fuel consumption and air emissions. This paper presents results of simulations using a modified version of the GREET 1.5a fuel cycle model to estimate the relative benefits of using E10 instead of conventional gasoline. In addition to obvious savings in petroleum usage, reductions in life-cycle hydrocarbon, carbon monoxide, sulfur dioxide and carbon dioxide emissions are predicted by the model. Cumulative emissions of particulates and nitrogen oxides, on the other hand, are expected to increase.

LAND USE AND CARBON BALANCE IMPLICATIONS OF COCONUT BIODIESEL UTILIZATION IN THE PHILIPPINES AUTOMOTIVE TRANSPORT SECTOR

RAYMOND R. TAN
Chemical Engineering Department, De La Salle University
Manila, Philippines

ALVIN B. CULABA
Mechanical Engineering Department, De La Salle University
Manila, Philippines

MICHAEL R. I. PURVIS
Department of Mechanical & Manufacturing Engineering
University of Portsmouth
London, England

Abstract:

The land use and carbon balance implications of a biodiesel program for road vehicles in the Philippines is assessed. Biodiesel is assumed to be the methyl ester of virgin coconut oil. Agricultural land requirements along with carbon dioxide reduction behefits reveal that 10% substitution is possible; higher penetration into the petroleum market is unrealistic. The substitution limit implies that biodiesel is best as a fuel additive or extended. Carbon balance benefits are assessed, revealing potential annual CO_2 reduction of 2.15 – 2.73 x 10^6 tons for 10% biodiesel substitution

A STUDY ON SUITABLE INJECTION PRESSURE OF DIESEL SPRAY WITH ULTRA HIGH PRESSURE

DAE YONG, JEONG
Department of Mechanical Engineering Graduated School
Sungkyunkwan University Suwon,Korea
E-mail: dyjeong@nature.skku.ac.kr

JONG TAI, LEE
Department of Mechanical Engineering
Sungkyunkwan University Suwon,Korea
E-mail: jtlee@yurim.skku.ac.kr

Abstract:

In order to clarify a suitable injection pressure and a limit injection pressure for enhancement of spray characteristics in ultra high pressure region, ultra high pressure injection equipment was developed and the characteristics of the free spray injected under atmosphere condition were analyzed. Ultra high pressure over 4,000bar is realized by 2-stage compression with quick motion using hydraulic system. The results show that as injection pressure becomes higher, spray penetration and spray angle were increased and droplet size was decreased continuously. But the rates of these enhancement become moderate around injection pressure of 2,200bar, and have tendency to be reduced at ultra high pressure of 4,140bar. It means that a suitable injection pressure and a limit injection pressure are existed around above pressure in behalf of analysis of free spray.

STUDIED OF ADAPTABILITY FOR DIESEL ENGINE FROM COAL LIQUEFIED OIL(CASE OF LIGHT NAPHTHA & FRACTION GAS OIL)

SHINJI MORIYA and HOROICHI WATANABE and RIKIO YAGINUMA
Department of Mechanical Engineering
College of Engineering, NIHON UNIVERSITY
E-mail: moriya@mech.cenihon-u.ac.jp

Abstract:

It has been know that recent year, fossil fuels, especially petroleum, giving out on the worldwide scale. So, we have noticed abundant the estimated amount of coal deposits and studied about coal liquefied oil (Light Naphtha & Fraction Gas Oil), coal is pyrolyzed and extracted, adaptability for diesel engines. The Coal liquefied oil are fed to Diesel engines of several factories as a 40~50vol.% blended fuels with gas oil. The coal liquefied oil by this method above will be very good contribution to energy and environments of the earth. In this

paper is showed used of fundamental experiments (ignition Time & Ignition Temperature, Kinematic viscosity, Calorific Value) and the blending oil for engine performance.

STREAMLINED ENVIRONMENTAL LIFE-CYCLE ASSESSMENT USING FUZZY SEMIQUANTITATIVE EVALUATION MATRICES

RAYMOND R. TAN
Chemical Engineering Department, De La Salle University, Manila

Abstract:

Standard life cycle assessment (LCA) as described in the SETAC standard and the ISO 14040 series requires extensive investment in time and resources to execute effectively. The difficulty of undertaking a full LCA study has deterred many potential users; it has also stimulated interest in developing streamlined versions of standard LCA methodology. This paper presents a streamlined LCA procedure based on Graedel and Allenby's matrix method. The principal feature of this novel procedure is the use of a fuzzy semiquantitative scale for evaluating various environmental aspects. The user or analyst scores the system under assessment subjectively with the aid of a 5-point numerical scale; uncertain estimates are represented with triangular fuzzy numbers. A case study involving the comparative assessment of two different battery technologies for electric vehicles (EVs) illustrates the utility of the method.

A METHODOLOGY FOR ENVIRONMENTAL IMPACT AND PRODUCTIVITY ANALYSIS OF A SEMICONDUCTOR ASSEMBLY/PACKAGING OPERATION

RUBY PINEDA–HENSON
Department of Industrial Engineering
Holy Angel University
Angeles City, Philippines

ALVIN B. CULABA
Department of Mechanical Engineering
De La Salle University
Manila, Philippines

Abstract:

This paper presents a methodology for the multi-criteria analysis of a semiconductor assembly/ packaging operation based on environmental and productivity performance. The term 'green productivity' will be used for brevity, to refer to the combined concept of environmental and productivity performance.

The usual framework for analyzing environmental aspects and performance is called the "resource productivity" framework as proposed by Porter (1995). This approach makes it imperative to adopt a full systems view on the costs and value associated with the product and considers resource inefficiencies in the form of incomplete material utilization, poor process controls resulting in unnecessary waste defects and other hidden costs in the product life cycle.

In industry, a new paradigm called Green Productivity integrates environmental performance with productivity improvement where the latter provides the framework for continuous improvement and the former, the foundation for sustainable development (APO, 1999). So far, an extensive survey of published literature reveals that studies on Green Productivity applications are still scarce. No specific indicators have been established so far for the Green Productivity Program being promoted by the Asian Productivity Organization where environment indicators and productivity indicators are used as and when appropriate.

This study finds relevance in the semiconductor assembly/packaging sector of the electronics industry in the Philippines. Electronics constitute 72% of the total exports, about 78% of which are semiconductor products. Semiconductors, provide the essential hardware component for high technology industries. It is therefore important to ensure the environmental sustainability of semiconductor manufacturing, as well as other manufacturing industries, for long term economic viability.

BIOREMEDIATION: UTILIZATION OF PSEUDOMONAS AEROGENOSA IN THE DEGREDATION OF WASTE AUTOMOTIVE ENGINE OIL

ALBERTO T. MANSILLA
Technological University of the Philippines – Cavite
Dasmaranis, Cavite, Philippines
Atmp22y@yahoo.com

Abstract:

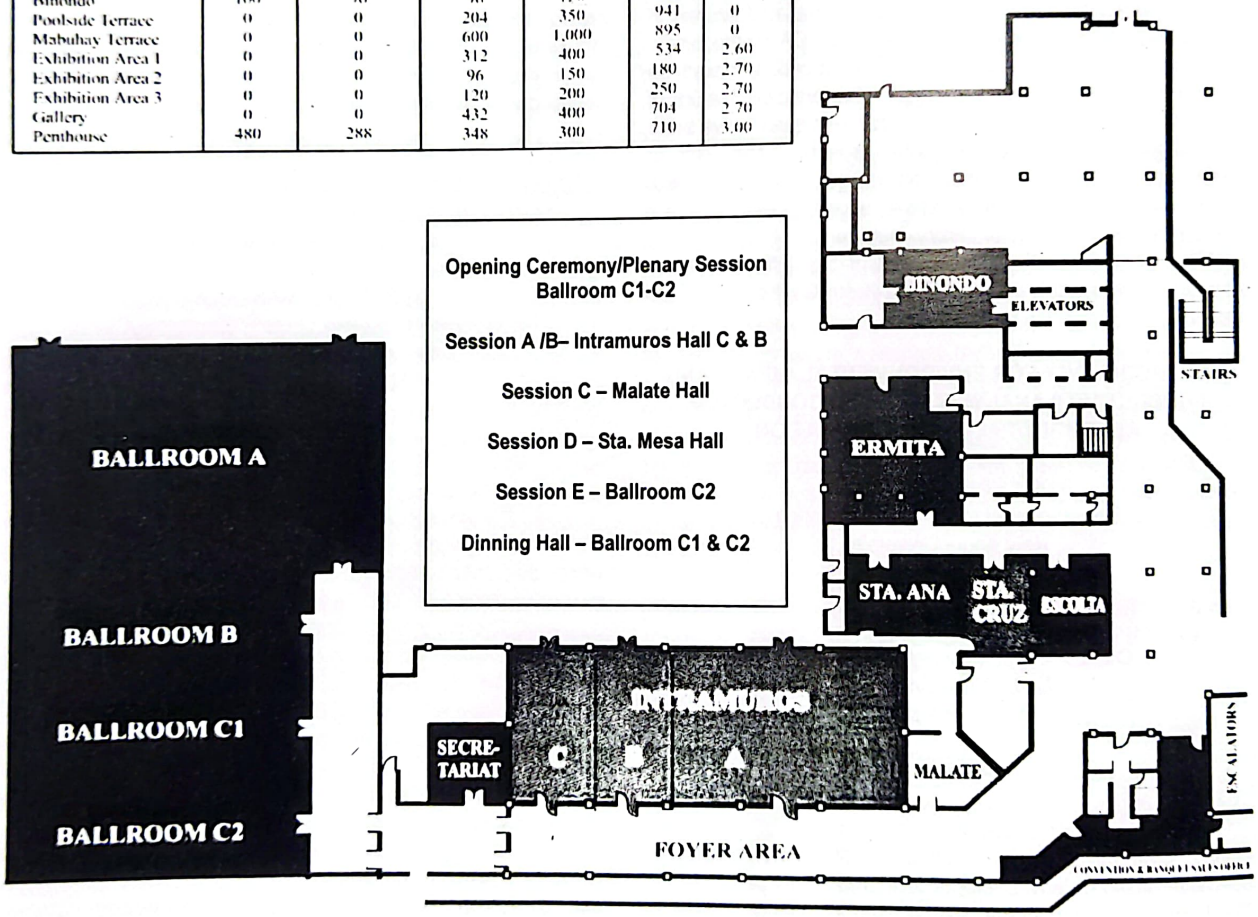
This study was conducted to isolate from natural environment decomposer bacteria having the ability to degrade waste automotive engine oil. Bacteria able to metabolize the toxic substance was obtained with minimal salt broth (MSB) containing hydrocarbon substrate as its sole carbon source. The liquid medium with the oil substrate (MSBO) was then inoculated with oil contaminated soil (MSBOS) and allowed to incubate. For control, another 30 ml. of MSBO was left uninoculated but was allowed to incubate for 7 days. Bacteria growing from both medium were plated in MacConkey agar.Oil degrading capability were tested by growing them in a mineral medium where waste engine oil was used as main source of carbon.

Through a computer based bacteria identification software – BBB Crystal NFT Test – 4 isolates were identified in the inoculated medium (MSBOS), Enterobacter Clocae, Klebsiella Oxytoca, Aeromonas. Caviae and Pseudomonas. Aerogenosa. Three isolates,in turn, were identified from the uninoculated medium (MSBO),Enterobacter Taylorae, Klebsiella Pneumonae and Klebsiella Oxytoca. Assessment of oil degradation of the identified isolates was measured in terms of decrease in weight of the oil-inoculated media.

***

	CAPACITY				DIMENSIONS	
	Theater	Classroom	Banquet	Cocktail	Area (m²)	Height (m)
Grand Ballroom	3,500	2,064	2,244	3,000	2,120	5.50
• Ballroom A	1,200	720	792	1,000	798	5.50
• Ballroom B	600	320	384	500	428	5.50
• Ballroom C	900	480	576	800	673	5.50
Secretariat	96	72	48	80	60	3.23
Intramuros Ballroom	864	496	576	750	610	4.50
• Intramuros A	550	288	336	450	370	4.50
• Intramuros B	110	72	96	150	120	4.50
• Intramuros C	110	72	96	150	120	4.50
Malate	80	40	60	80	65	2.70
Sta. Mesa	80	40	60	80	62	2.70
Escolta	0	0	22	0	77	2.88
Sta. Cruz	100	64	60	90	63	2.84
Sta. Ana	100	68	60	100	85	2.72
Ermita	120	104	144	245	170	2.75
Binondo	100	96	96	150	95	2.75
Poolside Terrace	0	0	204	350	941	0
Mabuhay Terrace	0	0	600	1,000	895	0
Exhibition Area 1	0	0	312	400	534	2.60
Exhibition Area 2	0	0	96	150	180	2.70
Exhibition Area 3	0	0	120	200	250	2.70
Gallery	0	0	432	400	704	2.70
Penthouse	480	288	348	300	710	3.00

FLOOR PLAN



Audio-Visual Equipment

LCD Projector
U-Matic Player (Multi-System)
VHS Player (Multi-System)
CD Player
Video Camera/Video Light
Opaque Projector
Overhead Projector
Slide Projector
TV Monitor (20" Multi System)
Tape Deck
Lapel Microphone
Microphone with stand
Dalite Tripod Screen
Audio Mixer
Bass Speaker Baffles
Wireless Microphone

Technological University of the Philippines
INTEGRATED RESEARCH AND TRAINING CENTER
Manila, Philippines

日本大学

Nihon University
COLLEGE OF SCIENCE AND TECHNOLOGY
Tokyo, Japan

cordially request the honor of your presence at the

OPENING CEREMONIES

of

The 5TH International Conference on Civil Engineering
The 3rd Pacific-Asia Conference on Mechanical Engineering

P R O G R A M M E

Thursday, August 29, 2002

I - Registration

II - National Anthem (Philippines, Japan)

III - Welcome Address ..... **Dr. FEDESERIO C. CAMARAO**
President, Technological University of the Philippines

Dr. KATSUE KOJIMA
Dean, College of Science and Technology, Nihon University, Japan

IV - Introduction of the Keynote Speaker **Dr. EMILIANA VR. TADEO**
Vice President for Research and Extension, TUP

V - Keynote Address ..... **Dr. ESTRELLA F. ALABASTRO**
Secretary, Department of Science and Technology

VI - Conference Mechanics ..... **Engr. FELIPE RONALD M. ARGAMOSA**
President, IRTC Foundation, Inc.

Master of Ceremony

Prof. NENET C. GRAZA
Technological University of the Philippines

Technological University of the Philippines
INTEGRATED RESEARCH AND TRAINING CENTER
Manila, Philippines

日本大学

Nihon University
COLLEGE OF SCIENCE AND TECHNOLOGY
Tokyo, Japan

cordially request the honor of your presence at the

CLOSING CEREMONIES

of

The 5TH International Conference on Civil Engineering
The 3rd Pacific-Asia Conference on Mechanical Engineering

P R O G R A M M E

Friday, August 30, 2002

Part I -	**Impressions**	**Dr. NATHANIEL B. DIOLA** Associate Professor, Civil Engineering Department University of the Philippines, Quezon City
		Dr. HARUYUKI NAKAYAMA Associate Professor, Department of Transportation Engineering and Socio Technology, Nihon University, Japan
		Dr. RICARTE C. NUÑEZ Director for Research, Western Institute of Technology Iloilo City
		Dr. HWA SOO LEE Department of Mechanical Engineering College of Science and Technology, Nihon University, Japan
	Closing Remarks	**Dr. MITSUKAZU NAKANISHI** Faculty, Department of Oceanic Architecture and Engineering College of Science and Technology, Nihon University, Japan
	Distribution of Certificates...	Conference Chairman / Secretariat
Part II - 6:00		**Cocktails**

Master of Ceremony

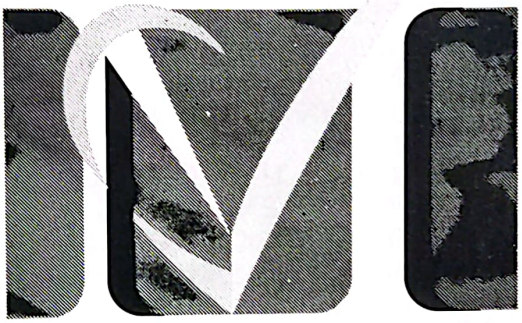
Prof. LORETO G. AGUILA
Technological University of the Philippines

Compliments from:

Are you a local association, corporation, government or non-government entity planning or preparing for an event in Manila; or seriously considering bidding for an international or regional event to be held in Manila?

PRESENTING

Convention City



MANILA

Where people meet ... in 1996...

In 1996, the Philippine convention industry will celebrate 20 years as a leading destination for meetings, incentives, conventions and exhibitions. As 1996 is a very special year for Philippine tourism, the Department of Tourism and the Philippine Convention & Visitors Corporation have created a package of incentives to encourage local associations, corporations, government and non-government institutions to actively bid for international or regional events to be held in Manila in 1996 and beyond.

CHECK OUT THE CONVENTION CITY MANILA PACKAGE OF SENSATIONAL INCENTIVES, UNBEATABLE DISCOUNTS AND MANY OTHER SPECIAL PRIVILEGES!

FOR MORE INFORMATION, FAX US AT:
Fourth Floor, Suites 10-17, Legaspi Towers 300, Roxas Blvd., Metro Manila, Philippines 1000
Tel: 575-031 to 039 Fax: 521-6165

PHILIPPINE CONVENTION & VISITORS CORPORATION

Meeting the world's convention needs, with Heartware that can only be Filipino.

Philippine Airlines

CONVENTION CITY MANILA is a concerted effort by venue owners, hotels, ground handlers, tourist transport operators, Philippine Airlines, and other private and public sector entities, all coordinated by the Departme . of Tourism and the Philippine Convention & Visitors Corporation.

Compliments from:

AUGUSTIN INT'L CENTER, INC.

(Licensed by POEA – DOLE No. POEA – 303 - LB – 062102 – R)
202 Gochangco Bldg., 610 T.M. Kalaw St., Ermita, Manila
Tel. Nos.: 5244448 / 5248219 / 5244416 Fax. No.: 5244458
Email: augustin@augustin-ph.com Website: www.augustin-ph.com

IN COOPERATION WITH OUR MAJOR FOREIGN PRINCIPALS IN ENGINEERING & CONSTRUCTION :

شركة نسما و الفضل للمقاولات المحدودة
nesma & alfadl contracting co, ltd.
NESMA & ALFADL CONT. CO., LTD., K.S.A.
ACCRE. NO. 64648

MANNAI TRADING CO. W.L.L., QATAR
ACCRE. NO. 68162

ABDULAZIZ ALI AL-TURKI & PARTNERS CO. / RAWABI TRDG.& CONT. CO. LTD., K.S.A.
ACCRE. NO. 61208

Require professionals for immediate deployment and for continuous hiring as follows :

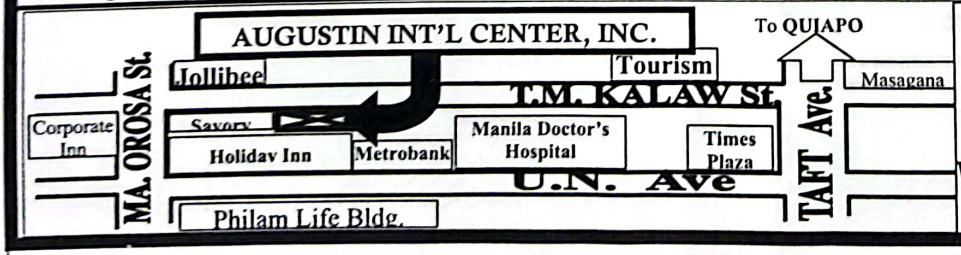
A. STRUCTURAL & DESIGN
- STRUCTURAL ENGINEERS
- SR. CIVIL DESIGN ENGINEERS
- SR. HVAC DESIGN ENGINEERS
- SR. PLUMBING DESIGN ENGINEERS
- SR. ELECTRICAL DESIGN ENGINEERS

B. PLANNING, ESTIMATES, & PROCUREMENT
- SR. PLANNING ENGINEERS (MECHANICAL/CIVIL)
- SCHEDULING & COST CONTROL ENGINEERS
- LEAD PROPOSALS ENGINEERS (MECHANICAL)
- PROPOSALS ENGINEERS (INSTRUMENTATION/ELECTRICAL)
- PROCUREMENT ENGINEERS (PLUMBING/HVAC/MECHANICAL)
- ESTIMATION MANAGERS / ESTIMATION ENGINEERS (ARCHITECTURAL / HVAC / CIVIL / MECHANICAL / ELECTRICAL)
- QUANTITY SURVEYORS (ARCHITECTURAL / HVAC / CIVIL / MECHANICAL / ELECTRICAL)

C. SAFETY & QUALITY
- SAFETY MANAGERS / SR. SAFETY ENGINEERS
- SAFETY OFFICERS/ENGINEERS (ONSHORE/OFFSHORE)
- QA/QC MANAGERS / SUPERVISOR
- QA/QC INSPECTORS / QA/QC ENGINEERS

D. TECHNICAL SUPPORT
- CADD OPERATORS (CIVIL/ARCHITECTURAL/HVAC/PLUMBING/ELECTRICAL/MECHANICAL)
- EXECUTIVE SECRETARIES / OFFICE MANAGERS

Qualified candidates must come personally for interview along with the following necessary documents accomplished in 2 sets:
1. Comprehensive Resume' with photo and Detailed Job Description
2. School Credentials/Certificates (Transcript of Records, Diploma, etc.)
3. Employment Certificates 4. Passport & NBI (if available)



VISIT OUR WEBSITE: www.augustin-ph.com

Compliments from:

INTEGRATED RESEARCH AND TRAINING CENTER FOUNDATION, Inc.,

Officers and Board of Directors - 2002-2003

FELIPE RONALD M. ARGAMOSA
President

JEDEL G. AGRON
Vice President

JUANITO M. VILLANUEVA
Secretary

REY CRISANTO P. HIZON
Treasurer

MANUEL N. CAWIL
Auditor

LORETO G. AGUILA
RYENALDO O. BAARDE
Board Members

IRTC Faculty and Staff
Members

Compliments from:

日 本 大 学

NIHON UNIVERSITY
OTA OVERSEAS ACADEMIC INTERCHANGE FUND

Expresses Congratulations
For the Success of

The 5th INTERNATIONAL CONFERENCE ON CIVIL ENGINEERING (5 ICCE)

and

THE 3rd PACIFIC ASIA CONFERENCE ON MECHANICAL ENGINEERING (3 PACME)

August 29-31, 2002
IRTC-TUP Manila, Philippines

8-24, Kudan Minami, 4 Chome
Chiyoda-ku, Tokyo 102-8275 Japan

日本大学

NIHON UNIVERSITY
COLLEGE OF SCIENCE AND TECHNOLOGY

Expresses Congratulations
For the Success of

THE 5th INTERNATIONAL CONFERENCE ON CIVIL ENGINEERING (5 ICCE)

and

THE 3rd PACIFIC ASIA CONFERENCE ON MECHANICAL ENGINEERING (3 PACME)

August 29-31, 2002
IRTC-TUP Manila, Philippines

From

Department of Transportation Engineering and Socio-Technology
and
Department of Mechanical Engineering

Compliments from:

SAVAC
NGO

BASIC PROGRAMS OF SAVAC

1.0 SAVAC Scholarship Grant
2.0 SAVAC Social Welfare
3.0 SAVAC Career Development
4.0 SAVAC Home Stay Development

TAKAHISA YAMADA
Chairman

OSAMU SAIJO
Managing Director

Office: 806 Ogura Saiwai-ku Kawasaki-shi Japan
(Postal code 211-0954)
Phone 044-587 – 8055 FAX 044-588-6511