

TABLE OF CONTENTS

PAGE NO.

KEYNOTE ADDRESS

- The Impact of the World Wide Web (WWW) on Modal Analysis.....xiii
D. L. Brown, University of Cincinnati (USA)

INVITED SPEECHES

- POD (Product On Demand): Innovative Product Design for the 21st Centuryxviii
K. Ohtomi, Toshiba Corporation (Japan)
- Total Life Support for Mechanical Structuresxxii
T. Koizumi, Doshisha University (Japan)

A-1PM Rotating Machinery I

- Experimental Modal Analysis of Systems with Parametric Excitation1
J. Bienert and H. Witfeld, Univ. of the Federal Armed Forces (Germany)
- Experimental and Numerical Analysis Using Finite Element Method of Rotor Shaft with
Skew and Unbalances Vibration System Model8
B. Budiwantoro, H. Yanis and M. Kabullah, Institute of Technology Bandung (Indonesia)
- Dynamic Characteristics of Rubbing Phenomenon in Rotor Dynamics15
Y. S. Choi, Sungkyunkwan University (Korea)

B-1PM Vehicle I

- Wavelet Analysis of Car Seat Vibrations23
M. Ruzzene, B. Piombo and F. De Serafini, Politecnico di Torino (Italy)
- Experimental Spatial Matrix Identification Method (The Current Theory and a Basic
Verification)29
M. Okuma, Q. Shi and T. Oho, Tokyo Institute of Technology (Japan)
- An Approach to System Identification of the Internal Combustion Engine for Automated
Automobiles36
Q. Liu and G. Wu, Harbin Institute of Technology (China)
- Optimization for Tractor Frame Including Dynamic Characteristic of Joint Part40
T. Koizumi, N. Tsujiuchi, S. Sawabe, Doshisha University (Japan); I. Kubomoto,
E. Ishida, Kubota Corp. (Japan); and F. Ohtani, Nippon Serc, Inc. (Japan)
- The Application of Vibration Testing Techniques on an Agricultural Cultivator Handler47
A. P. Cherng, National I-Lan Institute of Agriculture and Technology (Taiwan)
- Prediction of Powerplant Vibration Using Test Based Modal Model54
Y. Takeuchi, H. Tsukahara and M. Sato, Subaru Research Center Co., Ltd. (Japan)
- Active Exhaust Noise Cancellation System for Constant Speed Diesel Engine60
M. Okubo, H. Kanda, S. Ishida and T. Yonezawa, Yanmar Diesel Engine Co., Ltd. (Japan)

C-1PM Active Control

- Vibration Control of a 3-D Truss Structure with Piezoelectric Active Member65
L. Zhang, Nanjing University of Aeronautics & Astronautics (China)
- The Adaptive Sound Field Equalizing Method by Active Mode Control72
T. Ise, N. Saito and M. Akiho, Alpine Electronics, Inc. (Japan)
- Application of Adaptive Technology to Control of Rotor Blade Dynamics and Stability79
G. Surace, L. Cardascia, Politecnico di Torino (Italy); and V. Anghel,
University 'POLITEHNICA' (Romania)
- A Methodology for Multi-Disciplinary Optimal Design Synthesis, and Applications85
N. Tzannetakis, R. Cartuyvels and J. L. Migeot, LMS Numerical Technologies (Belgium)
- Active Microvibration Control System by Considering Elastic Deformation Modes of
Vibration Isolation Table92
H. Yoshioka, N. Murai, T. Abe and Y. Hashimoto, Takenaka Corporation (Japan)
- The Research of Active Noise Control of Single Frequency and Open Loop System
in Automobile Air Ducts98
S. Chai, X. Meng, Shandong Institute of Technology (China);
and S. Li, Xi'an Jiaotong University (China)
- A Sensitivity Analysis Approach to Actuator Placement in Vibration Active Control System102
M. Zhu, C. Zhao, Nanjing University of Aeronautics & Astronautics (China);
F. Wang and J. Yan, Southeast University (China)

A-2AM Experimental Techniques

- Further Development of the Tip Excitation Technique for the Measurement of
Rotational Compliance of Curved Panels107
L. Cheng, Laval University (Canada)
- The Influence of the Axial Preloading on the Bending Frequencies of a Mechanical System113
R. Boudet, UPS Toulouse (France); and M. Cavacece, University of Cassino (Italy)
- Modal Analysis of Large-scale Trunnion Ring Structure120
J. Zou and D. Wu, University of Science and Technology, Beijing (China)
- Moment Excitation in Mobility Measurements Using the Source Signal Filtering Technique125
M. A. Sanderson, Chalmers University of Technology (Sweden)
- Measurements of Oil Film Pressure in Engine Bearings131
T. Someya, Y. Mihara, Musashi Institute of Technology (Japan); L. Gaul,
Universität Stuttgart (Germany); and O. Mahrenholtz, Technische Universität
Hamburg-Harburg (Germany)
- Consideration of Transducer-Loading Effects in Modal Processing137
J. Decker and H. Witfeld, Univ. of the Federal Armed Forces (Germany)

B-2AM Test / Analysis Integration

- A Refined P-value Formulation for Finite Element Model Updating144
H. Grafe, M. Imregun and D. J. Ewins, Imperial College of Science, Technology
and Medicine (UK)
- Effects of Mass of Liquid Bulk Materials on the Dynamic Characteristics of Thin Walled
Structures149
D. Tran, Victoria University of Technology (Australia)
- Free Vibration Analysis of 4 Edged Clamped, Isotropic Square Plates with 2 Collinear
Circular Holes156
Y. S. Lee and Y. B. Lee, Chung-nam National University (Korea)
- On the Integration of Experimental Data, Numerical Simulation Results and Analytical
Modeling Knowledge into the Process of Engineering Design and Evaluation163
S. Rudolph, University of Stuttgart (Germany)
- Vibration Analysis of the Structure Exposed to Multidimensional Base Excitation.....170
T. Yoshimura, Tokyo Metropolitan University (Japan)
- A Machine Tool Application of Multiple Reference Impact Testing176
T. Yoshimura, Tokyo Metropolitan University (Japan); B. Fladung and
D. L. Brown, University of Cincinnati (USA)

C-2AM System Identification

- Applications of an Enhanced Mode Indicator Function Parameter Estimation Algorithm183
T. Yoshimura, Tokyo Metropolitan University (Japan); W. A. Fladung,
A. W. Phillips and D. L. Brown, University of Cincinnati (USA)
- Application of Sensitivity Analysis to Identify the Parameters of Mechanical Joints195
J. H. Wang and M. J. Yang, National Tsing Hua University (Taiwan)
- Dynamic Behavior of Wire Rope Coupling with Nonlinear Hysteresis Characteristics203
X. Gong, Chongqing University (China); M. Zhao and Z. Luo,
Shanghai JiaoTong University (China)
- Estimating Modal Parameters from Different Solution Sets207
A. W. Phillips and R. J. Allemang, University of Cincinnati (USA)
- Vibration Analysis of the Triangular, Rectangular and Trapezoidal Composite and
Composite-Al Hybrid Plates.....216
Y. S. Lee, M. H. Choi and S. Y. Song, Chung-nam National University (Korea)

A-2PM Laser Measurement

- Dynamic Characterization of Turbine Blades: Comparison between Finite Element Method
and Laser Scanning Vibrometer Measurement Results223
P. Castellini, G. M. Revel, E. P. Tomasini, Università di Ancona (Italy); M. Cecconi
and F. Valeri, Nuovo Pignone SpA (Italy)
- A Compact Laser Doppler Vibrometer Using an Optical-waveguide and a Laser Diode229
T. Nakayama, M. Saitoh, Sony Corporation (Japan); A. Kuroda and K. Taniguchi,
Sony Precision Technology Inc. (Japan)

Digital Speckle Pattern Interferometry: A Method to Measure Frequency Response Functions	233
Ch. De Veuster, P. Slangen, Y. Renotte, L. Berwart and Y. Lion, University of Liège (Belgium)	
Structural System Identification of a Scaled Wicket Model by Using Experimental Data from SLDV	239
M. R. Chowdhury, R. L. Hall, U.S. Army Engineer Waterways Experiment Station (USA); and W. X. Li, Volvo-GM Heavy Truck Corp. (USA)	
Problems in Vibration Measurement by Laser Techniques through Combusting Flows	245
N. Paone and G. M. Revel, Università degli Studi di Ancona (Italy)	
Vibration Measurements on Blades of Naval Propeller Rotating in Water	253
P. Castellini and C. Santolini, Università degli Studi di Ancona (Italy)	
 B-2PM Acoustics I	
An Efficient Numerical Scheme for Evaluating the Response of Aerospace Components in Random Environments	262
J. P. Coyette, C. Lecomte and K. Meerbergen, LMS Numerical Technologies (Belgium)	
Reduction of Structure-Borne Sound from Underground Railway Tracks Using Base-Isolation System	269
T. Abe, H. Yoshioka and Y. Hashimoto, Takenaka Corporation (Japan)	
Prediction and Virtual Replay of Noise for Gas Burning Water Heater in Consideration of Temperature Distribution in the Combustion Chamber	275
T. Toi, N. Okubo, T. Yajima, Chuo University (Japan); K. Matsubara and T. Iseki, Tokyo Gas Co., Ltd. (Japan)	
Investigation of Noise Sources and Analysis of Driven Valve System for Small Gasoline Engine	281
T. Koizumi, N. Tsujiuchi, T. Iritani, Doshisha University (Japan); I. Kubomoto and E. Ishida, Kubota Corp. (Japan)	
Modal Shapes Reconstruction Method for Vibroacoustic Sub-domains	288
T. A. Younes and M. A. Hamdi, Université de Technologie de Compiègne (France)	
The Changes of Sound Radiation Power of a Circular Plate with a Solid Shaft and a Solid Cylinder due to the Changes of Modal Damping Ratios	295
H. Kang, Toyota Motor Corporation (Japan); I. Hayashi and N. Iwatsuki, Tokyo Institute of Technology (Japan)	
Analyses and Experiments of Vibroacoustic Characteristics of Thin-wall Cavity	302
H. Chen, X. Hu and J. Zhao, Xi'an Jiaotong University (China)	
 C-2PM Rotating Machinery II	
Dynamic Characteristics and Fault Frequencies Interaction of Ball Bearing Supported Rotor	308
K. Bagiasna and Z. Abidin, Institute of Technology Bandung (Indonesia)	
Mechanical Vibrations Problems and Solutions in Large Scale Pumping Stations	315
M. A. Nasser, Menoufia University (Egypt)	

Study on Self-Excited Vibration of System Composed of Swash-Plate-Type Hydraulic Motor and Planetary Gear Machinery332
 S. Kashiwabara, H. Itoh and S. Nunotani, Komatsu Ltd. (Japan)

The Influence of Load Variation on the Vibration Spectrum of a Gear Mesh338
 Z. Abidin, K. Bagiasna and Y. Kusmanu, Institute of Technology Bandung (Indonesia)

A-3AM Modal Testing System

Development and Applications of the Operational Deflection Shape Analysis Software345
 M. S. Cho, Y. R. Kim, K. J. Kim, KAIST (Korea); and J. Y. Ha, Daewoo Heavy Industries Co., Ltd. (Korea)

Interactive Software Development System for Data Acquisition, Instrument Control and Testing350
 S. Ibrahim, A. W. I. Hashim and A. H. M. Zain, Universiti Teknologi Malaysia (Malaysia)

TPMMPI Software System353
 S. Cheng, J. Deng and H. Zhang, Northwestern Polytechnical University (China)

Modal Analysis of Cylindrical Shell with Thin Thickness359
 M. Cavacece and F. Graziano, University of Cassino (Italy)

Calculation of Rigid Body Properties from FRF Data: Practical Implementation and Test Cases365
 W. Leurs, L. Gielen, M. Brughmans and B. Dierckx, LMS International (Belgium)

B-3AM Optimization

Dynamics Characteristics and Model Optimization of Badminton Rackets (through Prototyping)372
 B. Budiwanto, I. W. Suweca, O. Sitorus and H. Tjahyadi, Institute of Technology Bandung (Indonesia)

Shape Optimization of Elastomeric Vibration Isolators Based on the Genetic Method376
 R. Muscia, University of Trieste (Italy)

Optimizing the Dynamic Behaviour of Vibrating Feeders Using Structural Modification and Structural Coupling Methods383
 H. F. Kuehlert, FH Bielefeld (Germany)

Optimisation of Structural Modifications Based on Frequency Response Functions390
 W. Heylen, M. Clara and D. Vandepitte, Katholieke Universiteit Leuven (Belgium)

Development of Partial Resonant Diaphragm (PRD) Loudspeaker395
 J. Yamamoto, T. Baba and S. Koyano, Pioneer Electronic Corporation (Japan)

C-3AM Structural Failure Monitoring

A Substructure Identification Method for the Assessment of Bond Conditions of Space Shuttle Tiles402
 F. A. Moslehy, University of Central Florida (USA); and J. Wu, Abex Friction Products (USA)

Analysis of the Harmonic Vibrations of a Beam with a Breathing Crack409
N. Pugno, R. Ruotolo and C. Surace, Politecnico di Torino (Italy)

Modal Analysis of Thread off Failure of Casing Thread Connection414
J. Zou, W. Li and Z. Yong, University of Science and Technology Beijing (China)

The Research of Wavelet Theory Application in Vibration Signal Analysis419
S. Li and Q. Xu, Xi'an Jiaotong University (China)

A-3PM Analytical Methods

Finite Element Simulation Analysis of The Ball / Thin Plate Impact426
S. Take, Daiwa Seiko, Inc. (Japan)

Dual Perturbation for Saving Calculation Time of Eigenvector Derivatives
of Modified Structure432
D. Zhang, Beijing Institute of Structure and Environment (China); and L. Zhang,
Nanjing University of Aeronautics and Astronautics (China)

The Influence of Some Parameters of Floating Raft System on Vibration Responses436
Z. Han, Y. Zhang, Shanghai Jiao Tong University (China); K. Ren and L. Lin, CSSC
(China)

The Influence of Friction Models on the Performance of Linear-Type Ultrasonic Motors440
C. Lu and J. Lee, National Taiwan University (Taiwan)

B-3PM CAE Applications

Use of Vibration Testing for IC Inspection Microscope and Assessment
of the Deflective Image447
M. Miyazaki and J. Mizuno, NIKON Corporation (Japan)

The Application of CAE Technique to Develop Audio Visual Products454
H. Kataoka, Pioneer Electronic Corporation (Japan)

Vibration Model of Rolling Mill in Unstable State Rolling459
J. Zhou, J. Yang, University of Science and Technology Beijing (China); and
X. Guo, Beijing University of Aeronautics and Astronautics (China)

Modelling of Railway Track for Computer Simulation of Dynamic Train/Track Interaction464
A. Igeland and J. Oscarsson, Chalmers University of Technology (Sweden)

Modal Synthesis Method for Vibration Isolation Design of the Rolling-Drum Type
Washing Machine471
D. B. Li, Tsinghua University (China); and L. H. Yam, The Hong Kong
Polytechnic University (Hong Kong)

C-3PM Damping

Improved Method for Estimation of Complex Modulus and Damping477
S. Gade and N. J. Wismer, Brüel & Kjær (Denmark)

Optimal Dynamic Design Using Design Sensitivity Analysis and Structural Dynamic Modifications	483
S. S. A. Ravi, T. K. Kundra and B. C. Nakra, Indian Institute of Technology (India)	
Plate Vibration Control by Using Bean Bag Damper	490
H. Chen, T. Chen and X. Huang, Xi'an Jiaotong University (China)	
Structural Damping Measurement Under Random Excitation	497
X. Dong and J. R. Houghton, Tennessee Technological University (USA)	
A Frequency Dependent Structural Damping Model	504
A. de Boer, National Aerospace Laboratory (The Netherlands)	

A-4AM Acoustics II

Dynamic Model for a Resilient Train Wheel	508
E. van Haaren, NS Technical Research (The Netherlands); J. W. Verheij, G. Verbeek and A. J. G. Schoofs, Eindhoven University of Technology (The Netherlands)	
Optimization of Structure to Reduce Sound Radiation Power by Using Feasible Direction Method	515
M. Saitoh, Suzuki Motor Corporation (Japan); I. Hayashi and N. Iwatsuki, Tokyo Institute of Technology (Japan)	
A Study on the Water Fall Noise of Drainage Collecting Pipe	520
K. Imamura, Y. Nakamura and Y. Takemoto, Kubota Corporation (Japan)	
Acoustics of Cantilever Flat Plates	527
N. K. Mandal, University of Technology Malaysia (Malaysia); and M. W. Uddin, Bangladesh University of Engineering and Technology (Bangladesh)	
Use of Uniform Theory of Diffraction in View to Combine it with Boundary Element Method to Solve Acoustical Problems	532
Z. El Hachemi, Ph. Gagniol and M. Bentahar, Université de Technologie de Compiègne(France)	
Application of FEM Modal Analysis for Estimation of Sound Radiation Power	539
Y. Kagawa, I. Hayashi and N. Iwatsuki, Tokyo Institute of Technology (Japan)	

B-4AM Substructuring Methods

Using Frequency Response Function Based Hybrid Substructuring Procedures: The Virtues of Static and Dynamic Compensation	545
K. Wyckaert, LMS International (Belgium); K. Q. Xu and P. Mas, Katholieke Universiteit Leuven (Belgium)	
Vibration Analysis of Structures with Line Coupling Using a Hybrid Approach	552
M. Hatam and L. Cheng, Laval University (Canada)	
Power Based Data Reduction Technique for Impedance Coupling	559
L. Bregant and F. Di Marino, Università di Trieste (Italy)	
Mode Trimming in Nominally Axi-Symmetric Structures	566
C. H. J. Fox, University of Nottingham (UK)	

C-4AM Civil Engineering Structures

- Bridge-Vehicle Interaction Force Identification from Bridge Responses573
T. H. T. Chan, S. S. Law, The Hong Kong Polytechnic University (Hong Kong);
and X. R. Yuan, Shijiazhuang Railway Institution (China)
- Non-Linear Dynamic Response Characteristics in Bridges of Composite Construction580
N. Haritos and T. Chalko, The University of Melbourne (Australia)
- Experimental Dynamic Testing and Numerical Verification of a Prestressed
Concrete Bridge.....587
M. M. Abdel Wahab and G. De Roeck, Katholieke Universiteit Leuven (Belgium)
- Ground Vibrations; Field Measurements and Prediction Using Finite Element Technique594
J. Jonsson, Chalmers University of Technology (Sweden)
- Vibration Prediction of Large Production Facilities601
Y. Hashimoto, H. Yoshioka and T. Abe, Takenaka Corporation (Japan)

A-4PM Vehicle II

- Calculation of Noise Transfer Functions on a Body-In-White608
L. Meulewaeter and P. Guisset, LMS Numerical Technologies (Belgium)
- Analysis of a Passenger Car Interior Noise under Driving Condition by the MISO Modeling
Technique613
B. K. Bae, K. J. Kim, Y. G. Kim, Y. H. Kim, KAIST (Korea); M. G. Kim and
C. H. Hyun, Hyundai Motor Co. (Korea)
- The Frequency Response Function Based Substructuring Technique: A Useful
Methodology for Vehicle Interior Acoustical Prediction619
K. Wyckaert, M. Brughmans, LMS International NV (Belgium); C. Zhang and
R. Dupont, Renault S. A. (France)
- Evaluation Technique for Vehicle Body Dynamics in the Mid to High Frequency Range628
A. Suto, K. Kudo and T. Yamashita, HONDA R&D Co., Ltd. (Japan)

B-4PM Aerospace Structures

- Structural Dynamic Behaviour in Microgravity Conditions633
T. Olbrechts, D. Vandepitte, P. Bielen and D. Moens, Katholieke Universiteit
Leuven (Belgium)
- A Ground Vibration Test on the Garteur Testbed SM AG-19640
A. J. Persoon, National Aerospace Laboratory (The Netherlands); and E. Balmès,
ONERA (France)
- Free Vibration of an Idealized Fuselage Structure647
M. Petyt, University of Southampton (UK); and J. Wei, Arvin Exhaust R&D (UK)
- Global Vibro-Acoustic Modeling of an Aircraft Cabin in the Medium Frequency Range654
H. Van der Auweraer, M. Iadevaia, LMS International (Belgium); U. Emborg and M.
Gustavsson, Saab AB (Sweden)

FE Model Tuning of Satellite Solar Array Substrate	661
H. B. Kim, S. M. Moon, J. J. Lee, Korea Aerospace Research Institute (Korea); and E. Dascotte, Dynamic Design Solutions (Belgium)	
Global Damage Identification in Aerospace Structures Using "Twin" Structures Modal Method	667
P. M. Trivailo and L. A. Plotnikova, Royal Melbourne Institute of Technology (Australia)	
The Frequency Domain Maximum Likelihood Method to Identify the Equivalent System of Aircraft	676
S. Cheng, J. Deng and H. Zhang, Northwestern Polytechnical University (China)	
 C-4PM Modal Parameter Identification	
A Critical Evaluation of Modal Parameter Extraction Schemes for Output-Only Data	682
L. Hermans, H. Van der Auweraer, LMS International (Belgium); and M. Abdelghani, INRIA-IRISA (France)	
Modal Parameter Estimation with Uniform Tolerances	689
T. J. Chalko, V. Gershkovich and N. Haritos, University of Melbourne (Australia)	
Experimental Modal Analysis in Frequency Domain	696
M. Iwahara, Isuzu Advanced Engineering Center, Ltd. (Japan); T. Sugiura and A. Nagamatsu, Tokyo Institute of Technology (Japan)	
Development of Accurate Frequency-Domain Modal Parameter Estimation Techniques for Modal Analysis	703
P. Guillaume, Vrije Universiteit Brussel (Belgium)	
Development of a Modal Parameter Estimation Method Using a Non-Linear Optimization Technique	710
Y. H. Ju, Korea Heavy Industries & Construction Co., Ltd. (Korea); and G. M. Lee, Gyeongsang National University (Korea)	
Estimation of Modal Damping Ratios from Mode Indicator Function	717
M. Okuma and R. Momose, Tokyo Institute of Technology (Japan)	