8th IFToMM International Conference on Rotor Dynamics 2010

Seoul, Korea
12-15 September 2010

Volume 1 of 2

ISBN: 978-1-61839-347-0

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571

Some format issues inherent in the e-media version may also appear in this print version.

Printed by Curran Associates, Inc. (2012)

International Federation for the Promotion of
Mechanism and Machine Science (IFToMM)
Attn: Dr. Joseph Rooney
Faculty of Mathematics, Computing and Technology
The Open University
Walton Hall
Milton Keynes MK7 6AA
UNITED KINGDOM

Phone: (0) 1908 652979
Fax: (0) 1908 654052

j.rooney@open.ac.uk

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

[MoA1] Condition Monitoring, Fault Diagnostics and Prognostics I

Room A	Session Chair	A. Parey (Indian Institute of Technology Indore, India)
	Time	10:30-12:10

MoA1-1 10:30-10:55 Alternative Approaches to Design Balancing Filters for the Improvement of Model-Based Fault Diagnosis 1

P. Beckerle, H. Schaede, and S. Rinderknecht, (Technische Universität Darmstadt, Germany)

MoA1-2 10:55-11:20 Error Analysis of a New Cylindrical Capacitive Sensor for Measuring Five-Dimensional-Motions of a Rotor 9

H.-J. Ahn (Soongsil University, Korea) and S. Jeon (University of Waterloo, Canada)

MoA1-3 11:20-11:45 Continuous Wavelet Time-Division Scale Level Moment Quantitative Approach for Vibration Analysis of Rotating Machinery 17

T. Yang, F. Chen, Y. Zhang, G. Wei, S. Huang, and P. Zhang (Huazhong University of Science and Technology, China)

MoA1-4 11:45-12:10 Condition Monitoring System 28

J. S. Rao, K. Swaroop, N. Rangarajan, and S. Mantrawadi (Altair Engineering India Pvt Ltd, India)

September 13, 2010 (Monday)

[MoB1] Dynamic Analysis and Stability I

Room B	Session Chair	W. J. Chen (Eigen Technologies, Inc., United States)
	Time	10:30-12:35

MoB1-1 10:30-10:55 Comparative Study on Frequency-speed Diagrams in Rotating Machinery 36

C.-W. Lee (KAIST, Korea)

MoB1-2 10:55-11:20 Influence of Tilting Pad Journal Bearing Models on Rotor Stability Estimation 46

C. H. Cloud (BRG Machinery Consulting, United States), E. H. Maslen (James Madison University, United States), and L. E. Barrett (University of Virginia, United States)

MoB1-3 11:20-11:45 The Application of Fuzzy Random Finite Element Method on Rotor Dynamics 55

H. Yao, Q. Han, and B. Wen (Northeastern University, China)

MoB1-4 11:45-12:10 Rotordynamic Characteristics of Large Locomotive Turbochargers 60

W. J. Chen (Eigen Technologies, Inc., United States)

MoB1-5 12:10-12:35 Dynamic Analysis and Control of Rigid Rotor Supported by Noncollocated Active Magnetic Bearings 68

H.-W. Jeon, C.-W. Lee (KAIST, Korea), and S.-J. Kim (Korea Institute of Science and Technology, Korea)

September 13, 2010 (Monday)

[MoC1] Bearings and Seals I

Room C		
	Session Chair	C. H. Kim (Korea Institute of Science and Technology, Korea)
	Time	10:30-12:35

MoC1-1 10:30-10:55 Stability Analysis of Foil Journal Bearings Considering Coulomb Friction 75

D. H. Lee (University of Texas at Arlington, United Sates), Y. C. Kim (Korea Institute of Machinery and Materials, Korea), and K. W. Kim (KAIST, Korea)

MoC1-2 10:55-11:20 Nonlinear Characterization of an Elastohydrodynamic Point Contact under Harmonic Loading 81

F. Nonato (Schaeffler Brasil Ltda, Brazil) and K. L. Cavalca (University of Campinas, Brazil)

MoC1-3 11:20-11:45 Oil Induced Instability: Analytic Study and Experimental Verification on Fexible Rotor Supported by a Journal-Bearing at One End 87

J.-C. Luneno, J.-O. Aidanpää (Luleå University of Technology, Sweden), and R. K. Gustavsson (Vattenfall Research and Development AB, Sweden)

MoC1-4 11:45-12:10 Non-Synchronous Tilting Pad Beraing Characteristics 95

J. Schmied (DELTA JS AG, Switzerland), A. Fedorov, and B. S. Grigoriev (Saint-Petersburg State Polytechnical University, Russian Federation)

MoC1-5 12:10-12:35 Asymmetrical Heating in a Tilting Pad Journal Bearing Causing Shaft Bending 101

B. S. Grigoriev, A. Fedorov (Saint-Petersburg State Polytechnical University, Russian Federation), and J. Schmied (DELTA JS AG, Switzerland)

September 13, 2010 (Monday)

[MoD1] Modal Testing and Identification

Room D		
	Session Chair	I. Bucher (Technion, Israel)
	Time	10:30-13:00

September 13, 2010 (Monday)

[MoE1] Special and General Problems of Rotating Machines I

Room E		
	Session Chair	K. L. Cavalca (University of Campinas, Brazil)
	Time	10:30-13:00

MoE1-1 10:30-10:55 Validation of a 3D Contact Algorithm for the Study of Blade-Tip/Casing Contacts in Turbomachines 151

A. Batailly (McGill University, Canada), B. Magnain (ENSIB-Institut PRISME, France), M. Legrand, and C. Pierre (McGill University, Canada)

MoE1-2 10:55-11:20 Dynamics of Flexible Rotors Supported on Elastomer Bearings 159

A. Scholz, R. Liebich (Berlin Institute of Technology, Germany), G. Paysan, and R. Blutke (Rolls-Royce Deutschland Limited & Co KG, Germany)

MoE1-3 11:20-11:45 Studies on Dynamical State Stability of the Aero-engine Rotor Joint Structures 166

S. Liu, Y. Ma, and J. Hong (Beijing University of Aeronautics and Astronautics, China)

MoE1-4 11:45-12:10 A Complete Rotordynamic Analysis of a Rotor-Disk System Using Finite Element Method 174

J. Chaudhry, M. Wagner, F. He, A. Younan, T. Dimond, J. Cao, and P. Allaire (University of Virginia, United States)

MoE1-5 12:10-12:35 Complex Response of a Rotor-Bearing-Foundation System 183

P. M. Santana, K. L. Cavalca, E. P. Okabe, and T. H. Machado (University of Campinas, Brazil)

MoE1-6 12:35-13:00 Rotor Dynamics in Dimensionless Quantities Part I - Static Unbalance 191

A. Zhivotov and Y. Zhivotov (Yuzhnoye State Design Office, Ukraine)

September 13, 2010 (Monday)

[MoA2] Condition Monitoring, Fault Diagnostics and Prognostics II

Room A		
	Session Chair	A. S. Lee (Korea Institute of Machinery and Materials, Korea)
	Time	15:10-16:50

September 13, 2010 (Monday)

[MoB2] Nonlinear Phenomena I

Room B	Session Chair	J. Jiang (Xi'an Jiaotong University, China)
	Time	15:10-16:25

MoB2-1 15:10-15:35 Transient Rubs in Turbomachinery and Their Impact on Revolution Speed 222

O. M. V. Bargen, P. Kalinowski, and R. Liebich (Technische Universität Berlin, Germany)

MoB2-2 15:35-16:00 Unbalance Identification in Nonlinear Rotors 230

T. S. Morais, V. Steffen Jr (Federal University of Uberlandia, Brazil), J. Mahfoud, and J. D. Hagopian (Institut National de Sciences Appliquées de Lyon, France)

MoB2-3 16:00-16:25 Stability Analysis of Rotors Supported by Floating Ring Bearings 238

A. Boyaci, W. Seemann, and C. Proppe (Karlsruhe Institute of Technology, Germany)

September 13, 2010 (Monday)

[MoC2] (Structured Session) Cracks in Rotating Machinery Components I

Room C		
	Session Organizer	N. Bachschmid (Politecnico di Milano, Italy)
	Session Chair	T. Inoue (Nagoya University, Japan)
	Time	15:10-16:25

September 13, 2010 (Monday)

[MoD2] Special and General Problems of Rotating Machines II

Room D	Session Chair	J. T. Sawicki (Cleveland State University, United States)
	Time	15:10-16:50

MoD2-1 **15:10-15:35** **Torsional Stiffness Modeling and Vibration Simulation of 2-Pole Turbogenerator Rotor** 271

B. Irwanto and T. Prothmann (Alstom, Switzerland)

MoD2-2 **15:35-16:00** **Study on Torsional Vibration of Turbine Generator Shafts Owning to Network Disturbance** 276

D. Jiang, C. Liu, and J. Chen (Tsinghua University, China)

MoD2-3 **16:00-16:25** **Dynamics of Model Bladed Disc with Friction Elements for Vibration Suppression** 284

L. Pesek, L. Pust, F. Vaněk, J. Veselý, and J. Cibulka (IT AS CR, v.v.i., Czech Republic)

MoD2-4 **16:25-16:50** **A New Way of Writing Motion Equations in Rotating Machines by Translation into the Angular Domain** 292

A. Bourdon, H. André, and D. Rémond (Université de Lyon, France)

September 13, 2010 (Monday)

[MoE2] (Structured Session) Design and Control of Magnetic Bearings

Room E	Session Organizer & Chair	P. Allaire (University of Virginia, United States)
	Time	15:10-16:50

MoE2-1 15:10-15:35 Characterization and Commissioning of a Centrifugal Compressor Surge Control Test Rig 300

K. T. Lim, S. Y. Yoon, C. P. Goyne, Z. Lin, and P. Allaire (University of Virgina, United States)

MoE2-2 15:35-16:00 Automated Design Optimization of E-Core Active Magnetic Bearings 307

T. Dimond (University of Virginia, United States), T. Meriwether (National Ground Itelligence Center, United States), J. Kaplan, R. Rockwell, and P. Allaire (University of Virginia, United States)

MoE2-3 16:00-16:25 Smart Properties of AMB Supported Machines for Rotor Crack Detection: Experimental and Analytical Study 314

Z. Kulesza (Bialystok University of Technology, Poland), J. T. Sawicki, and D. L. Storozhev (Cleveland State University, United States)

MoE2-4 16:25-16:50 Analytical Methods of Sensors and Actuators Recollocation in Vibration Control Systems 322

Z. Gosiewski, Z. Kulesza, and F. Siemieniako (Bialystok University of Technology, Poland)

[TuA1] Condition Monitoring, Fault Diagnostics and Prognostics III

Room A		
	Session Chair	R. Garcia-Illescas (Mexican Electric Research Institute, Mexico)
	Time	10:10-12:15

TuA1-1 **10:10-10:35** **Application of Robust Regression Methods to Fault Identification in Rotating Machinery** **328**

P. Pennacchi, S. Chatterton, R. Ricci, and A. Vania (Politecnico di Milano, Italy)

TuA1-2 **10:35-11:00** **Turbounit Overhaul Evaluation by Diagnostics and Vice Versa** **336**

V. Barzdaitis (KaunasUniversity of Technology, Lithuania), M. Bogdevič ius (Vilnius Gediminas Technical University, Lithuania), and R. Didižokas (Klaipėda University, Lithuania)

TuA1-3 **11:00-11:25** **Investigation of Blade Failure in a Gas Turbine** **344**

Y.-S. Choi (Sungkyunkwan University, Korea) and K.-H. Lee (Korea Failure Investigation Center, Korea)

TuA1-4 **11:25-11:50** **A New Diagnosis Method of Vibration Faults of Rotating Machinery Based on Process** **350**

F. Chen and S. Huang (Huazhong University of Science and Technology, China)

TuA1-5 **11:50-12:15** **Condition Monitoring of a Turboset by Measurement of Its Torsional Vibration** **356**

T. Barszcz, T. Uhl, J. Urbanek (Akademia Górniczo-Hutnicza University of Science and Technology, Poland), and B. Schmidt (EC Systems, Poland)

September 14, 2010 (Tuesday)

[TuB1] Dynamic Analysis and Stability II

Room B		
	Session Chair	C. H. Cloud (BRG Machinery Consulting, United States)
	Time	10:10-12:15

TuB1-1 **10:10-10:35** **Rotordynamic Linear and Nonlinear Stability Characteristics of a Medium-Size High-Speed Turbocharger** 362

A. S. Lee and B. O. Kim (Korea Institute of Machinery and Materials, Korea)

TuB1-2 **10:35-11:00** **A Parametric Study on the Stability and Disturbance Rejection of Magnetically-Levitated Flywheel Energy Storage Systems According to Inertia Ratios** 367

S.-Y. Yoo (Chungnam National University, Korea), W.-R. Lee, Y.-C. Bae (Korea Electric Power Research Institute, Korea), and M. Noh (Chungnam National University, Korea)

TuB1-3 **11:00-11:25** **Rotordynamic Performance Measurement of an Oil-Free Turbocompressor Supported on Gas Foil Bearings** 372

Y.-B. Lee, S.-B. Cho, T.-Y. Kim, C. H. Kim, and T. H. Kim (Korea Institute of Science and Technology, Korea)

TuB1-4 **11:25-11:50** **A Parametric Study of the Unbalance Response of an Aero-Engine** 379

P. M. Hai and P. Bonello (The University of Manchester, United Kingdom)

TuB1-5 **11:50-12:15** **A New Dimensionless Stability Map of Rotor Bearing System Allowing for Manufacturing Tolerances Based on a Modified Summerfeld Number** 387

W. Xu (Guangxi University of Technology, China), P. J. Ogrodnik , M. J. Goodwin, and G. A. Bancroft (Staffordshire University, United Kingdom)

[TuC1] Bearings and Seals II

Room C	Session Chair	K. Miatliuk (Bialystok Technical University, Poland)
	Time	10:10-12:15

TuC1-1 **10:10-10:35** **Bifurcation of Periodic Motion of Rigid Rotor Ball Bearing System Considering Five Degrees of Freedom** 393

L. Cui, C. Liu, and J. Zheng (East China University of Science and Technology, China)

TuC1-2 **10:35-11:00** **Non-Synchronous Vibration of Jeffcott Rotor due to Internal Radial Clearance in Roller Bearings** 398

J. Wu, M. Legrand, and C. Pierre (McGill University, Canada)

TuC1-3 **11:00-11:25** **Sensitivity Analysis of Squeeze Film Dampers Using Reynolds Equation** 406

A. O. Pugachev (Technische Universität München, Germany), V. V. Tykhomirov, A. V. Sheremetyev, O. I. Shpilenko, and I. D. Timchenko (SE Ivchenko-Progress, Ukraine)

TuC1-4 **11:25-11:50** **A Lubrication Design Application of Spiral Groove Liquid Seal to the Carrier of Vane-Type LPG Fuel Pump** 415

A. S. Lee and C. U. Kim (Korea Institute of Machinery and Materials, Korea)

TuC1-5 **11:50-12:15** **Prediction of Leakage and Rotordynamic Coefficients for Annular-Type-Plain-Pump Seal Using CFD Analysis** 422

B. S. Choe and T. W. Ha (Kyungwon University, Korea)

September 14, 2010 (Tuesday)

[TuD1] Active Components and Vibration Control I

Room D		
	Session Chair	T. Watanabe (Nihon University, Japan)
	Time	10:10-12:40

TuD1-1 **10:10-10:35** **Vibration Control of a Flexible Shaft Supported by a Hybrid Foil-Magnetic Bearing** 427

S.-N. Jeong, H.-J. Ahn (Soongsil University, Korea), S.-J. Kim, and Y.-B. Lee (Korea Institute of Science and Technology, Korea)

TuD1-2 **10:35-11:00** **Unbalance Compensation in Three-Pole Magnetic Bearing System by Extended Influence Coefficient Method** 434

S.-H. Park and C.-W. Lee (KAIST, Korea)

TuD1-3 **11:00-11:25** **An Application of the Magneto-Rheological Actuators to Torsional Vibration Control of the Rotating Electro-Mechanical Systems** 440

T. Szolc, Ł. Jankowski (Polish Academy of Sciences, Poland), A. Pochanke (Warsaw University of Technology, Poland), and A. Magdziak (Polish Academy of Sciences, Poland)

TuD1-4 **11:25-11:50** **Design and Control of Hybrid Magnetic Bearing in a Flywheel Energy Storage System** 448

W.-Y. Kim, J. M. Lee, S.-J. Kim, Y.-B. Lee (Korea Institute of Science and Technology, Korea), and Y.-C. Bae (Korea Electric Power Research Institute, Korea)

TuD1-5 **11:50-12:15** **New Approach to the Numerical Analysis of the Swirl Water Turbine and Experimental Verification** 454

E. Malenovsky, F. Pochyly, P. Rudolf, L. Pohanka, and M. Chlud (Brno University of Technology, Czech Republic)

TuD1-6 **12:15-12:40** **Transient Impact Dynamics of Rotor Drop on Rolling-Element Backup Bearing in a Flexible Rotor Supported on Active Magnetic Bearings** 461

C. Zhu (Zhejiang University, China)

[TuE1] Blades and Bladed Systems and Impellers

Room E		
	Session Chair	R. B. Randall (The University of New South Wales, Australia)
	Time	10:10-12:15

TuE1-1 **10:10-10:35** **Non-Contact Gas Turbine Blade Vibration Measurement from Casing Pressure and Vibration Signals-A Review** 468

G. L. Forbes and R. B. Randall (The University of New South Wales, Australia)

TuE1-2 **10:35-11:00** **Transient and Modal Analysis of a Rotating Multi-packet Blade System having a Crack** 476

S. M. Kwon and H. H. Yoo (Hanyang University, Korea)

TuE1-3 **11:00-11:25** **Multidisciplinary Technology for Blade Bending-Torsion Flutter Prediction** 482

J. M. Temis (Central Institute of Aviation Motors, Russian Federation)

TuE1-4 **11:25-11:50** **Modelling and Design of Passive Damping of Turbine Blade Vibrations** 490

M. Hajžman, M. Byrtus, V. Zeman, J. Kellner, and J. Šašek (University of West Bohemia, Czech Republic)

TuE1-5 **11:50-12:15** **Experimental and Numerical Analysis of the Forced Response of the Mistuned First Stage Compressor Bladed Disc of an Aircraft Engine** 500

R. Rzadkowski (Institute of Fluid-Flow Machinery, Poland), R. Szczepanik (Air Force Institute of Technology, Poland), M. Drewczyński , M. Soliński, A. Maurin, and A. Maciejewska (Institute of Fluid-Flow Machinery, Poland)

September 14, 2010 (Tuesday)

[TuA2] Condition Monitoring, Fault Diagnostics and Prognostics Ⅳ

Room A		
	Session Chair	R. Subbiah (Siemens Energy, United States)
	Time	14:40-16:20

[TuB2] Dynamic Analysis and Stability III

Room B		
	Session Chair	E. Malenovsky (Brno University of Technology, Czech Republic)
	Time	14:40-16:45

September 14, 2010 (Tuesday)

[TuC2] (Structured Session) Cracks in Rotating Machinery Components II

Room C	Session Organizer & Chair	N. Bachschmid (Politecnico di Milano, Italy)
	Time	14:40-16:20

[TuD2] Active Components and Vibration Control II

Room D	Session Chair	T. Szolc (Polish Academy of Sciences, Poland)
	Time	14:40-16:45

September 14, 2010 (Tuesday)

[TuE2] Rotor Dynamics of Micro Machines

Room E		
	Session Chair	Z. Kozanecki (Techical University of Lodz, Poland)
	Time	14:40-16:20

TuE2-1 **14:40-15:05** **A Miniature High-Speed Spindle with Permanent Magnet-Biased Active Magnetic Bearings** 623

S.-K. Ro, W.-C. Shin, J.-H. Kyung, and J.-K. Park (Korea Institute of Machinery and Materials, Korea)

TuE2-2 **15:05-15:30** **The Dynamic Properties of the Micro-Rotor Supported on Fluid-Film Bearings** 628

J. Kicinski, G. Zywica, (Polish Academy of Sciences, Poland), and W. Miaskowski (University of Warmia and Mazury, Poland)

TuE2-3 **15:30-15:55** **Theoretical and Experimental Investigations of Oil-Free Support Systems to Improve the Reliability of Industrial Turbomachinery** 633

Z. Kozanecki and D. Kozanecka (Techical University of Lodz, Poland)

TuE2-4 **15:55-16:20** **Nonlinear Rotordynamic Analysis and Test Response of 100KW Micro Gas Turbogenerator Supported on Floating Ring Bearings** 640

N. Shen, Y. Jiao, Z. Chen, and W. Ma (Harbin Institute of Technology, China)

[WeA1] Case Studies of Rotating Machinery

Room A	Session Chair	S. Braut (University of Rijeka, Croatia)
	Time	10:10-12:15

WeA1-1 10:10-10:35 Rotor Dynamic Modelling as a Powerful Support Tool for Vibration Analysis on Large Turbomachinery 647

K. Matthys (Laborelec, Belgium), M. Perucchi (DELTA JS AG, Switzerland), and K. D. Bauw (Laborelec, Belgium)

WeA1-2 10:35-11:00 The Unsteady Rotor Blade Forces for a Changing the Number of Stator Blades 654

R. Rzadkowski (Polish Academy of Sciences, Poland), V. Gnesin (National Ukraine Academy of Sciences, Ukraine), M. Soliński (Polish Academy of Sciences, Poland), and L. Kolodyazhnaya (National Ukraine Academy of Sciences, Ukraine)

WeA1-3 11:00-11:25 Critical Speed Analysis of Gas Lubricated Bearing Rotor System 662

Z. Fu, X. Liu (North China Electric Power University, China), and J. Yang (Chinese Academy of Sciences, China)

WeA1-4 11:25-11:50 Axial Pedestal Vibration on Large Turbogenerators 667

S. Yan (Siemens Energy, Germany)

WeA1-5 11:50-12:15 Blade Loss Simulations of Bending Vibrations Applied to a 1750 MW Turbo Generator Set 672

P. Verrier, H. Martina, and S. Kohli-Lynch (Electricite de France, France)

September 15, 2010 (Wednesday)

[WeB1] Dynamic Analysis and Stability Ⅳ

Room B		
	Session Chair	J. Zapomel (VSB-Technical University of Ostrava, Czech Republic)
	Time	10:10-12:40

WeB1-1 10:10-10:35 Dynamics of Compact Gas Turbine Rotor Supported by Gas Bearings 678

J. M. Temis, M. J. Temis, A. M. Egorov, and A. B. Meshcheryakov (Central Institute of Aviation Motors, Russian Federation)

WeB1-2 10:35-11:00 On Model Updating of Turbo-Generator Set 685

N. Bachschmid, R. Ricci, S. Chatterton, and P. Pennacchi (Politecnico di Milano, Italy)

WeB1-3 11:00-11:25 Analytical Analysis of MIMO Magnetic Bearing-Rotor System 693

Z. Gosiewski (Bialystok University of Technology, Poland)

WeB1-4 11:25-11:50 Engineering Stability Criterion and Its Experimental Validation of Frequency Coupled Modulation for Sliding Rotor-Bearing System 701

J. Yang (Chinese Academy of Sciences, China), C. Chen (Army Aviation Institute, China), Y. Liu (Liaoning Shihua University, China), and D. Han (Chinese Academy of Sciences, China)

WeB1-5 11:50-12:15 Study on Leakage in Labyrinth Seals System of a Turbine 709

W. Ma, Z. Chen, Y. Jiao, and N. Shen (Harbin Institute of Technology, China)

WeB1-6 12:15-12:40 Dynamics Analysis of Rotor with Floating Rings Package Bearing 714

Y. Rozhdestvenskiy, A. Boyarshinov, E. Zadorozhnaiy, A. Fisher, P. Taranenko, and S. Cherneyko (South Ural State University, Russian Federation)

[WeC1] (Structured Session) Cracks in Rotating Machinery Components III

Room C	Session Organizer & Chair	N. Bachschmid (Politecnico di Milano, Italy)
	Time	10:10-11:25

WeC1-1 10:10-10:35 Early Detection of Rotor Cracks by Measuring the Coupled Response under External Excitation 724

A. C. Chasalevris and C. A. Papadopoulos (University of Patras, Greece)

WeC1-2 10:35-11:00 Nonlinear Simulation of Continuous Rotor Bearing Systems with Multi-Step Geometry 732

A. C. Chasalevris and C. A. Papadopoulos (University of Patras, Greece)

WeC1-3 11:00-11:25 Study on the Bifurcation and Stability of the Periodic Motion of a Cracked Rotor Bearings System 739

C. Liu, S. Zhou, X. Zhou, C. Xia, and J. Zheng (East China University of Science and Technology, China)

September 15, 2010 (Wednesday)

[WeD1] (Structured Session) Rotordynamics of Oil-Free Shaft Support Systems

Room D		
	Session Organizer & Chair	C. DellaCorte (The National Aeronautics and Space Administration, United States)
	Time	10:10-12:15

WeD1-1 10:10-10:35 Rotordynamic Characteristics of 65kW Micro Turbine with Compliant Air Foil Bearings 746

K.-S. Kim, B.-C. Cho, and M.-H. Kim (Neuros Co. Ltd., Korea)

WeD1-2 10:35-11:00 Comparison of Thermo-Hydrodynamic Characteristics of Airfoil Bearings with Different Top Foil Geometries 751

D. Kim, D. H. Lee (University of Texas at Arlington, United States), Y. C. Kim, and K. Ahn (Korea Institute of Machinery and Materials, Korea)

WeD1-3 11:00-11:25 Integration Methodology for Oil-Free Shaft Support Systems: Four Steps to Success 759

S. A. Howard, C. DellaCorte, and R. J. Bruckner (The National Aeronautics and Space Administration, United States)

WeD1-4 11:25-11:50 Five Degrees of Freedom Nonlinear Rotor Dynamics Model of Rigid Rotor Supported by Multiple Airfoil Bearings 766

D. H. Lee and D. Kim (University of Texas at Arlington, United States)

WeD1-5 11:50-12:15 Measurements of Drag Torque, Lift Off Speed, and Structural Parameters in a 1st Generation Floating Gas Foil Bearing 774

L. S. Andrés (Texas A&M University, United States), J. Camero (University of Texas at San Antonio United States), S. Muller (Calvin College, United States), T. Chirathadam, and K. Ryu (Texas A&M University, United States)

[WeE1] (Structured Session) Electromechanical Interactions of Rotor Systems with Electric Generator or Motor Drive

Room E	Session Organizer & Chair	M. Karlsson (Lloyd's Register ODS, Sweden)
	Time	10:10-11:50

WeE1-1 10:10-10:35 Electromechanical Interactions of a Variable Speed Drive Driven Compressor Train 783

M. Karlsson (Lloyd's Register ODS, Sweden), C. M. Myllerup (Lloyd's Register ODS, Denmark), and D. Chan (Lloyd's Register ODS, China)

WeE1-2 10:35-11:00 Measurement and Simulation of Forced Torsional Vibration with Inter-Harmonic Frequencies in Variable Speed Drive Motor Driven Compressor 791

K. Tanaka (Hitachi Plant Technologies, Ltd., Japan), H. Nemoto (Hitachi, Ltd., Japan), N. Takahashi, Y. Fukushima (Hitachi Plant Technologies, Ltd., Japan), Y. Akita, and M. Tobise (Hitachi, Ltd., Japan)

WeE1-3 11:00-11:25 Rotordynamical Analysis of a Fourteen Pole Synchronous Generator due to Whirling Dependent Electromagnetical Forces 799

M. Karlsson (Lloyd`s Register ODS, Sweden), U. Lundin (Uppsala University, Sweden), and J.-O. Aidanpää (Luleå University of Technology, Sweden)

WeE1-4 11:25-11:50 Design of an Active Hydromagnetic Journal Bearing 807

M. G. Farmakopoulos, P. G. Nikolakopoulos, and C. A. Papadopoulos (University of Patras, Greece)

September 15, 2010 (Wednesday)

[WeA2] (Structured Session) Diagnostics of Rotating Machinery

Room A	Session Organizer & Chair	P. Pennacchi (Politecnico di Milano, Italy)
	Time	13:30-15:10

[WeB2] Nonlinear Phenomena II

Room B	Session Chair	Q. Han (Northeastern University, China)
	Time	13:30-15:10

WeB2-1 13:30-13:55 The Interplay of Linear and Nonlinear Modes on the Dynamics of a Rotor/stator Contact System 845

J. Jiang (Xi'an Jiaotong University, China)

WeB2-2 13:55-14:20 Resonance Capture of Rotor System Mounted on an Elastically Supported Base 851

Q. Han, X. Dong, and B. Wen (Northeastern University, China)

WeB2-3 14:20-14:45 Chaotic Vibration Responses of Continuous Rotating Flexible Shaft-Disk System with Rub-Impact between Disk and Stator 858

H. M. Khanlo, M. Ghayour, and S. Ziaei-Rad (Isfahan University of Technology, Iran)

WeB2-4 14:45-15:10 Bifurcation Characteristics of Rub-impact Fault in Rotor Systems 866

H. Ma, Y. Teng, B. Wang, and B. Wen (Northeastern University, China)

September 15, 2010 (Wednesday)

[WeC2] Balancing

Room C		
	Session Chair	M. M. L'vov (Siemens Energy Inc., United States)
	Time	13:30-14:45

[WeD2] (Structured Session) Application of the Rayleigh-Ritz Method in Rotordynamics I

Room D	Session Organizer & Chair	H. J. Holl (University of Linz, Austria)
	Time	13:30-15:10

WeD2-1 13:30-13:55 A Study of a Rotating System with Two Different Beam Elements and Bearings 887

D. Huber (Linz Center of Mechatronics GmbH, Austria), H. J. Holl (Johannes Kepler University of Linz, Austria), M. Nader (Linz Center of Mechatronics GmbH, Austria), and H.-G. V. Garβen (Siemens AG, Germany)

WeD2-2 13:55-14:20 Nonlinear Vibration Analysis of Discontinuous Coupled, Spinning Timoshenko Beams 895

S. Hubinger, H. Gattringer, H. Bremer (Johannes Kepler University Linz, Austria), and K. Mayrhofer (Siemens VAI Metals Technologies Gmbh & Co, Austria)

WeD2-3 14:20-14:45 Closed-Form Expressions for Forces Acting on a Rapidly Rotating Floating Bearing 903

A. K. Belyaev (Institute of Problem in Merchanical Engineering, Russian Federation), M. Krommer, and H. J. Holl (Johannes Kepler University Linz, Austria)

WeD2-4 14:45-15:10 Analysis of the Coupled Oscillations of Strip and Coiling Drum in a Winding Process 909

H. J. Holl (Johannes Kepler University Linz, Austria) and F. Hammelmuller (Linz Center of Mechatronics GmbH, Austria)

September 15, 2010 (Wednesday)

[WeE2] (Structured Session) Electrical Machines

Room E	Session Organizer & Chair	T. Holopainen (ABB Machines, Finland)
	Time	13:30-15:10

WeE2-1 13:30-13:55 Finite-Element-Analysis of the Relative Shaft Displacements in the Sleeve Bearings of a 2-pole Converter-Fed Induction Motor Concerning Excitation by Pulsating Torques 917

U. Werner (Siemens AG, Germany)

WeE2-2 13:55-14:20 Models for Constitutive Properties of Lamination Stack. Application to Different Sizes Laminated Rotors 924

G. Mogenier, T. N. Baranger, R. Dufour (University de Lyon, France), L. Durantay, and N. Barras (Converteam SAS, France)

WeE2-3 14:20-14:45 Electromechanical Interaction in Torsional Vibrations of Drive Train Systems Including an Electrical Machine 933

T. P. Holopainen (ABB Machines, Finland), A.-K. Repo (Konecranes, Finland), and J. Järvinen (ABB Machines, Finland)

WeE2-4 14:45-15:10 Torsional Interaction Optimization in a LNG Train with a Load Commutated Inverter 941

S. D. Puglia, S. D. Franciscis (GE Oil & Gas, Italy), S. V. D. Moortel, P. Jörg (ABB, Switzerland), T. Hattenbach (Bechtel Co., United States), D. Sgrò, L. Antonelli (GE Oil & Gas, Italy), and S. Falomi (University of Florence, Italy)

[WeA3] Parametric and Selfexcitation in Rotating Machinery

Room A	Session Chair	H.-J. Kim (Doowon Technical University, Korea)
	Time	15:30-16:45

September 15, 2010 (Wednesday)

[WeB3] Dynamic Analysis and Stability V

Room B		
	Session Chair	R. Dufour (University de Lyon, France),
	Time	15:30-16:20

September 15, 2010 (Wednesday)

[WeC3] Bearings and Seals III

Room C		
	Session Chair	J. Schmied (DELTA JS AG, Switzerland)
	Time	15:30-16:45

WeC3-1 15:30-15:55 Theoretical Means of Hierarchical Systems for Design of Magnetic Bearings 982

K. Miatliuk, Z. Gosiewski, and F. Siemieniako (Bialystok Technical University, Poland)

WeC3-2 15:55-16:20 A Design Fitting of Journal Bearings to the LPLI Fuel Pump Application 987

A. S. Lee and C. U. Kim (Korea Institute of Machinery and Materials, Korea)

WeC3-3 16:20-16:45 Mechanical Damping Measurement of Small Size Hydrodynamic Bearing Rotors without Physical Contact 992

Y. S. Ihn, J. C. Koo (Sungkyunkwan University, Korea), D. H. Oh (Chungnam National University, Korea), C. S. Kim, and H. Y. Kim (Samsung Electronics, Korea)

September 15, 2010 (Wednesday)

[WeD3] (Structured Session) Application of the Rayleigh-Ritz Method in Rotordynamics II

Room D	Session Organizer & Chair	H. J. Holl (University of Linz, Austria)
	Time	15:30-16:45

WeD3-1 15:30-15:55 Simulation of Modally Reduced Rotating Systems with Equivalent Bearing Forces 996

W. Witteveen (Linz Center of Mechatronic GmbH, Austria) and H. J. Holl (Johannes Kepler University Linz, Austria)

WeD3-2 15:55-16:20 Nonlinear Vibrations of Flexible High-Speed Rotors Supported by Visco-Elastic Bearings 1001

M. Nader (Linz Center of Mechatronics GmbH, Austria), H. Irschik (Johannes Kepler University Linz, Austria), M. Stangl (Linz Center of Mechatronics GmbH, Austria), and H.-G. V. Garssen (Siemens AG, Germany)

WeD3-3 16:20-16:45 Modeling of the Dynamic Response of a Francis Turbine 1009

P. Pennacchi, S. Chatterton, R. Ricci, and A. Vania (Politecnico di Milano, Italy)

[WeE3] Special and General Problems of Rotating Machines III

Room E	Session Chair	L. S. Andrés (Texas A&M University, United States)
	Time	15:30-16:45

WeE3-1 15:30-15:55 Stability Analysis of Rotating Composite Shafts Considering Internal Damping and Coupling Effects 1016

T. N. Baranger, E. Chatelet, M.-A. Andrianoely, and G. Jacquet-Richardet (Université de Lyon, France)

WeE3-2 15:55-16:20 Nonlinear Rotordynamics of Vehicle Turbochargers: Parameters Affecting Sub Harmonic Whirl Frequencies and Their Jump 1024

L. S. Andrés and A. Vistamehr (Texas A&M University, United States)

WeE3-3 16:20-16:45 Fluid Force Moments Acting on the Backshroud of a Francis Turbine Runner in Whirling and Precession Motions 1034

B. Song (Dalian University of Technology, China), H. Horiguchi (Osaka University, Japan), Z. Ma (Dalian University of Technology, China), and Y. Tsujimoto (Osaka University, Japan)