

ISROMAC-12

12<sup>th</sup> International Symposium on  
Transport Phenomena and  
Dynamics of Rotating Machinery  
2008

ISROMAC-12

February 17-22, 2008  
Honolulu, Hawaii, USA

Volume 1 of 3

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571  
[www.proceedings.com](http://www.proceedings.com)

ISBN: 978-1-60560-487-9

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

Copyright© (2008) by ISROMAC-12  
All rights reserved.

For permission requests, please contact ISROMAC-12  
at the address below.

ISROMAC-12  
c/o Gerard Bois

[gerard.bois@lille.ensam.fr](mailto:gerard.bois@lille.ensam.fr)

## TABLE OF CONTENTS

### Volume 1

<b>Invited Paper: Cloud Cavitation with Particular Attention to Pumps</b> .....	1
<i>Christopher Earls Brennen</i>	
<b>Cavitation Damage. Recent Developments, Methods and Facilities.</b> .....	2
<i>Yves LeCoffre</i>	
<b>European Aero-Thermal Turbine Research the Impact of EU Aeronautics Research Programmes</b> .....	20
<i>C.H. Sieverding</i>	
<b>Gas Turbine Blade Design Using Multi-Objective Optimization and Dual Geometry Representation</b> .....	60
<i>T. Mengistu, W. Ghaly</i>	
<b>Experimental Characterisation and Modelling of Turbocharger Heat Transfers Under Steady and Transient Conditions</b> .....	68
<i>M. Cormerais, P. Chesse, J.F. Hetet, A. Yammine</i>	
<b>Aerodynamic Mistuning Effects on Blade Row Unsteady Aerodynamics</b> .....	79
<i>Sanford Fleeter, Dana Gottfried</i>	
<b>Proposing a Novel Approach in Plant Design: The Combined Calculation of Power Plant Processes and Component Stress</b> .....	89
<i>D. Bohn, R. Krewinkel, Chr. Rakut</i>	
<b>Large Eddy Simulation of Non-Isothermal Turbulent Rotor-Stator Flows</b> .....	99
<i>S. Poncet, E. Serre</i>	
<b>On the Flow Behaviour in Rotor-Stator System with Superimposed Flow</b> .....	108
<i>Roger Debuchy, Fadi Abdel Nour, Gérard Bois</i>	
<b>Method to Introduce Small Air Bubbles into the Water</b> .....	118
<i>N.Chiba</i>	
<b>Influence of the Blade Number on Inducer Cavitating Behavior Part 1: Study of Quasi –Steady Characteristics</b> .....	122
<i>O. Coutier-Delgosha, G. Caignaert, G. Bois, J-B Leroux</i>	
<b>Influence of the Blade Number on Inducer Cavitating Behavior Part 2: Analysis of Cavitation Instabilities</b> .....	123
<i>O. Coutier-Delgosha, A. Dazin, G. Caignaert, G. Bois</i>	
<b>Experimental Study of Cavitating Centrifugal Pump During Fast Start-Up</b> .....	124
<i>S. Duplaa, O. Coutier-Delgosha, A. Dazin, G. Bois, G. Caignaert, O. Roussette</i>	
<b>A Method Based on Potential Flow Theory for Estimating Ingestion into Cavities in Front of Airfoils in the Annulus Path</b> .....	134
<i>A. O. Schwientek, H. S. Gooma, B. Weigand, J. Von Wolfersdorf</i>	
<b>Towards the Control of Cavitating Flows</b> .....	144
<i>Roger E. A. Arndt, Martin Wosnik</i>	
<b>Rotordynamics and Uncertainty of Variables in Gas Turbine</b> .....	153
<i>Karl-Helmut Becker</i>	
<b>Weight Optimization of Turbine Blades</b> .....	160
<i>J.S. Rao, Ch. Bhaskar Kishore, Vasanthakumar Mahadevappa</i>	

<b>CFD Heat Transfer Predictions for a Gas Turbine Combustor Impingement Cooling Configuration</b> .....	168
<i>S. Spring, B. Weigand, W. Krebs, M. Hase</i>	
<b>CFD Simulation of the Unsteady Flow and Aeroacoustic Noise Generated by a Centrifugal Fan</b> .....	177
<i>M. Younsi, F. Bakir, S. Kouidri, R. Rey, T. Belamri, F. Menter</i>	
<b>PIV Measurements of Unsteady Flow in a Diffuser Pump at Different Flow Rates</b> .....	188
<i>Friedrich-Karl Benra, Jianjun Feng, Hans Josef Dohmen</i>	
<b>Spoke Centering Eccentricity – Statistical Tolerance Analysis</b> .....	196
<i>A.K. Stumvoll, J. Wittmer, H.-P. Kau</i>	
<b>Vibrational Effects of Bearing Misalignment Defect Expressed in the Form of Bearing Displacement Maps</b> .....	205
<i>Jozef Rybczynski</i>	
<b>Examination of Stator Clocking in a 3-Stage Axial Compressor at Design Point and Off-Design Point Operation</b> .....	215
<i>K. Theobald, H. Hönen</i>	
<b>Suppression of Performance Curve Instability of an Axial-Flow Pump by Using a Double-Inlet Nozzle</b> .....	226
<i>P. Pérez Flores, G. Kosyna, D. Wulff</i>	
<b>Influence of Real Gas Phenomena in a Multistage Gas Turbine Compressor</b> .....	234
<i>Edmund Kügeler, Keramat Fakhari, Reinhard Mönig, Karl Engel</i>	
<b>Measurements in an Unshrouded Pump Using Stereo-Particle-Image-Velocimetry</b> .....	244
<i>F. Fröhlig, S. Caglar, M. Gabi</i>	
<b>On the Application of Leaning Technique on Annular Turbine Cascades</b> .....	256
<i>A. Mora, G. D'ippolito, V. Dossena</i>	
<b>Self-Induced Flow Unsteadiness and Non-Synchronous Vibrations in Axial Compressors</b> .....	266
<i>Chunill Hah</i>	
<b>Predicting Cavitation in Automotive Torque Converters: Part I – Designs with Geometric Similitude</b> .....	275
<i>D. L. Robinette, J. M. Schweitzer, D. G. Maddock, C. L. Anderson, J. R. Blough, M. A. Johnson</i>	
<b>Predicting the Onset of Cavitation in Automotive Torque Converters: Part II – A Generalized Model</b> .....	283
<i>D. L. Robinette, J. M. Schweitzer, D. G. Maddock, C. L. Anderson, J. R. Blough, M. A. Johnson</i>	
<b>Numerical Investigations of the Cavitating Flow on Two-Dimensional Hydrofoils: Physical Modeling Methodologies</b> .....	292
<i>S. Frikha, O. Coutier-Delgossa, J. A. Astolfi</i>	
<b>Off-Design Performance of Gas Seal Pads on Herringbone Grooved Rotor</b> .....	302
<i>David P. Fleming</i>	
<b>No Vibration – No Problem: Or Is There?</b> .....	309
<i>G. Richard Thomas</i>	
<b>Experimental Investigation and Numerical Prediction of the Performance of a Cross-Flow Fan</b> .....	323
<i>Huai-Te Yu, Garth V. Gannon, J. Anthony, M. Platzer</i>	
<b>Simulation of Casing Treatments of a Transonic Compressor Stage</b> .....	331
<i>M. Hembera, H.-P. Kau, E. Johann</i>	
<b>Thermal-Fluid Transport Phenomena Between Twin Rotating Parallel Disks</b> .....	342
<i>S. Torii, W.-J. Yang</i>	

<b>Experimental and Numerical Investigations of the Radial Thrust in a Centrifugal Pump</b> .....	348
<i>J.F. Combes, A. Boyer, L. Gros, D. Pierrat, G. Pintrand, P. Chantrel</i>	
<b>Development of a Vaned Type Novel Air Turbine</b> .....	355
<i>Bharat Raj Singh, Onkar Singh</i>	
<b>Effect of Slot Gap Width on Turbine Blade Platform Film Cooling with Upstream Secondary Flow</b> .....	361
<i>S. A. Blake, D. H. Rhee, J. Grizzle, J.-C. Han</i>	
<b>Added Mass Effects in Hydraulic Turbines</b> .....	370
<i>Q. Liang, C. Valero, E. Egusquiza, X. Escaler, U.Seidel</i>	
<b>Optimization of the Web Geometry of a 180-Degree Bend Using an Experimentally Determined Ice Layer as Starting Contour: Part 1 – Experimental Results</b> .....	377
<i>S. Zehner, H. Steinbrück, B. Weigand, S.O. Neumann, J. Gier</i>	
<b>Gas Bearing Test Rig with the Shaft Supported on Magnetic Bearings</b> .....	386
<i>Nicoleta M. Ene, Laurentiu E. Moraru, Florin Dimofte, Abdollah Afjeh</i>	
<b>Form Factor at Speed From Routine Model Tests</b> .....	394
<i>L. Iannone</i>	
<b>Numerical Investigation of the Adiabatic Film-Cooling Effectiveness Around an HP-Turbine Airfoil: Decomposed Computation of Internal-External Flows</b> .....	405
<i>D. Charbonnier, M. Jonsson, P. Ott</i>	
<b>Optimization of the Web Geometry of a 180-Degree Bend Using an Experimentally Determined Ice Layer as Starting Contour: Part 2 - Numerical Simulation and Optimization</b> .....	416
<i>H. Steinbrück, S. Zehner, B. Weigand, S.O. Neumann, J. Gier</i>	
<b>Case Study of Resonance Phenomena in a Vertical Hydropower Unit</b> .....	424
<i>Mattias Nässelqvist, Rolf Gustavsson, Jan-Olov Aidanpää</i>	
<b>An Analytical Model for the Characterization of the Dynamic Transfer Matrix of Cavitating Inducers</b> .....	431
<i>Angelo Cervone, Yoshinobu Tsujimoto, Yutaka Kawata</i>	
<b>Detection and Analysis of Azimuthal Modes in a Centrifugal Impeller</b> .....	442
<i>D. Wolfram, Th. Carolus</i>	
<b>Numerical Studies on the Influence of the Incline of Cylindrical Blading on the Flow in Centrifugal Plug-In Fans</b> .....	449
<i>A. Willburger, M. Lawrenz</i>	
<b>Analysis of Numerical Experiment Simulation Within Axial-Flow Pump</b> .....	458
<i>Chen Hongxun, Wang Daozeng, Liang Xuejie, Wei Peiru, Zhang Wei, Li Haifeng</i>	
<b>Prediction of Flame Dynamics in a Matrix Burner</b> .....	463
<i>D. Bohn, N. Ohlendorf, J. Willie</i>	
<b>CFD Simulations and Conjugate Heat Transfer Analysis of a High Pressure Turbine Vane Utilizing Different Cooling Configurations</b> .....	473
<i>Gregory M. Laskowski, Gustavo A. Ledezma, Anil K. Tolpadi, Michael C. Ostrowski</i>	
<b>Improvement of Performance Estimation Model Using Internal Flow Analysis in an Industrial Torque Converter</b> .....	484
<i>Beomsoo Kim, Byunggil Lee, Seungbum Ha, Suk Won Cha, Wonsik Lim</i>	
<b>Experimental Investigation of Rotating Stall in a Two-Stage Axial-Flow Compressor</b> .....	492
<i>F. Nurzia, C. Palomba, P. Puddu</i>	

## Volume 2

<b>Vibration Analysis of Service Water Pump Motors - A Case Study</b> .....	502
<i>K.Ramakrishna</i>	

<b>A Study on Sensor Selection for Efficient Jet Engine Health Monitoring</b> .....	509
<i>S. Borguet, O. Léonard</i>	
<b>The Prediction of Hot Streak Migration in a High Pressure Turbine</b> .....	521
<i>Jonathan Ong, Robert J. Miller, John D. Denton</i>	
<b>Experimental and Numerical Investigations of Leading Edge Cavitation in a Helico-Centrifugal Pump</b> .....	531
<i>D. Pierrat, L. Gros, G. Pintrand, B. Le Fur, Ph. Gyomlai</i>	
<b>Effect of Hydrodynamic Thrust Bearings on Rotordynamics</b> .....	550
<i>Joel V. Madison</i>	
<b>Influence of Inlet Boundary Conditions in the Prediction of Rotor Dynamic Forces and Moments for a Hydraulic Turbine Using CFD</b> .....	560
<i>M. Karlsson, H. Nilsson, J-O. Aidanpää</i>	
<b>Parameter Study of Rotor Rubbing Control with an Active Auxiliary Bearing</b> .....	569
<i>L. Ginzinger, H. Ulbrich</i>	
<b>Non Linear Dynamic Analysis of Foil Bearings</b> .....	580
<i>S. Le Lez, M. Arghir, J. Frêne</i>	
<b>Properties of Some Pressure-Ratio Line of Radial Inflow Turbines and Application to Off-Design Considerations</b> .....	590
<i>N. Binder, X. Carbonneau, P. Chassaing</i>	
<b>Turbocharging – A Successful Symbiosis of Turbomachinery and Reciprocating Engines</b> .....	598
<i>H. Pucher, M. Vogt</i>	
<b>Preliminary Design of an Ultra-Micro Gas Turbine for Portable Power Generation</b> .....	606
<i>Roberto Capata, Enrico Sciubba</i>	
<b>Area Ratio Effects on Conically Expanded Hole Film Cooling Adiabatic Effectiveness</b> .....	619
<i>G. Barigozzi, G. Franchini, A. Perdichizzi</i>	
<b>Experimental Analysis of Rotor-Retainer-Bearing Interaction</b> .....	627
<i>M. Helfert, B. Aeschlimann, R. Nordmann</i>	
<b>Optimising and Manufacturing a Laser-Drilled Cooling Hole Geometry for Effusion-Cooled Multi-Layer Plates</b> .....	638
<i>R. Poprawe, I. Kelbassa, K. Walther, M. Witty, D. Bohn, R. Krewinkel</i>	
<b>Optimisation of Turbine Blade Shroud and Under-Platform Dampers: Part 1 - Experimental</b> .....	648
<i>S. Patsias, P. Doody, R. Elliott</i>	
<b>Minimization of Forced Vibrations of a Magnetically Levitated Shaft Due to Magnetization Tolerances</b> .....	658
<i>G. Jungmayr, W. Amrhein, H. Grabner</i>	
<b>Experimental and Numerical Investigation of Pressure Loss and Heat Transfer in a 180 Degree Bend of a Ribbed Multi-Pass Cooling Channel with Engine-Near Cross Section</b> .....	666
<i>M. Schüler, S. O. Neumann, B. Weigand</i>	
<b>Analysis of Axial Vibrations for Bearingless Segment Motors Arising From Parameter Excitation</b> .....	676
<i>W. Gruber, W. Amrhein, H. Grabner</i>	
<b>Effects of Axial Non-Uniform Tip Clearances on Aerodynamic Performance of a Transonic Axial Compressor</b> .....	685
<i>Hongwei Ma, ~ Baihe Li</i>	
<b>Theoretical Analysis of Rotating Film Cooling Mechanism: Part I. Dimensionless Groups of Adiabatic Effectiveness and Heat Transfer Coefficient</b> .....	691
<i>G.Q. Xu, B. Yang, Z. Tao, S.T. Ding, H.W. Wu</i>	

<b>Theoretical Analysis of Rotating Film Cooling Mechanism: Part II. A New Dimensionless Parameter to Describe the Coolant Deflection Phenomenon Near the Pressure Surface</b> .....	697
<i>G.Q. Xu, B. Yang, Z. Tao, S.T. Ding, X. Luo, H.W. Wu</i>	
<b>Suitability of Three Different Two-Equation Turbulent Models in Predicting Film Cooling Performance</b> .....	703
<i>Z. Tao, Z.M. Zhao, S.T. Ding, G.Q. Xu, H.W. Wu</i>	
<b>Experimental Dynamic Analysis of an Automotive Turbocharger in a Hot Gas Test Stand</b> .....	713
<i>G. G. Venson, J. E. M. Barros</i>	
<b>Influence of the Number of Flow Passages in the Simulation of the Rotating Stall</b> .....	719
<i>Minsuk Choi, Je Hyun Baek</i>	
<b>Turbomachinery of Efficient IGCC for Brown Coals</b> .....	728
<i>M. Stastny, D. Hanus, Z. Hrdina, J. Kucera, J. Polansky</i>	
<b>Thermo-Mechanical Transient Analysis of a First Stage Bucket</b> .....	733
<i>A. Campos-Amezcuca, Z. Mazur, A. Gallegos-Muñoz</i>	
<b>Determination of an Optimum Orbiting Radius for an Oil-Less Scroll Air Compressor</b> .....	742
<i>Tae Hun Kwon, Yong Ho Lee, Hyun Jin Kim</i>	
<b>Experimental and Numerical Investigation of Film Cooling Effectiveness and Heat Transfer Coefficient for Cylindrical Injection Holes</b> .....	749
<i>I. Koc, Y. Islamoglu</i>	
<b>Numerical Simulation of the Flow in a Two Stage Turbine Driving a Liquid Oxygen Pump</b> .....	759
<i>J.S. Rao, M.Saravanakumar</i>	
<b>Simultaneous Velocity and Concentration Measurements Using Laser-Optical Measurement Methods in Comparison with Reynolds Averaged Navier-Stokes Models</b> .....	766
<i>T. Lischer, G.D. Donnert, C108 F.C.C. Galeazzo, P. Habisreuther, N. Zarzalis, Rich Valdes, Werner Krebs</i>	
<b>Rotordynamic Effects of Adding Spherical Roller Thrust Bearing Stiffness Components to Fiber Refiner Models</b> .....	774
<i>M. Karlberg, J. Schedin</i>	
<b>A Noise Reduction Method for Vibration Measurements on Rotating Machineries</b> .....	782
<i>M. Karlberg</i>	
<b>On Similarities Between Flow Systems Operating at Excessive Gas Load and at Cavitation Conditions: Hydrofoil Tests and CFD Assessment</b> .....	788
<i>Morten Kjeldsen, Roger E.A. Arndt</i>	
<b>Unsteady Flows in Cascades of Last Stator Rows of Gas Turbine Axial Compressor Working in Off-Design Conditions</b> .....	796
<i>V. Cyrus, J. Polansky</i>	
<b>Dynamic Behavior of Vertical Axis Water Turbines: Two Ways of Handling the F/S Coupling</b> .....	806
<i>E. Chatelet, N. Driot, B. Alsayed, G. Jacquet</i>	
<b>Transient Dynamics of Centrifugal Pendulum Vibration Absorbers</b> .....	816
<i>Steven W. Shaw, Mark B. Orłowski, Alan G. Haddow, Bruce Geist</i>	
<b>Numerical Simulation of Active Flow Control in Hydro Turbines</b> .....	826
<i>R. Wunderer, R. Schilling</i>	
<b>Relative Ranking of Fatigue Lives of Rotating Aluminum Shafts Using L10 Weibull-Johnson Confidence Numbers</b> .....	836
<i>Brian L. Vlcek, Robert C. Hendricks, Erwin V. Zaretsky</i>	
<b>Relative Ranking of Fatigue Lives of Rotating Aluminum Shafts Using L10 Weibull-Johnson Confidence Numbers</b> .....	848
<i>Brian L. Vlcek</i>	

<b>Performance Improvement of Gas Turbine for the 3<sup>rd</sup> Unit of Kawasaki Thermal Power Plant with Fuel Changing (Abstract Only)</b> .....	859
<i>Hiroyuki Kuwazawa, Kenji Kameshima, Hideharu Kuriyama, Hirohiko Fukushima</i>	
<b>Experimental Measurement of Rotordynamic Fluid Forces on an Open-Type Centrifugal Impeller in Whirling Motion</b> .....	860
<i>Takayuki Suzuki, Romain Prunières, Hironori Horiguchi, Yoshinobu Tsujimo</i>	
<b>Effect of the Unsteadiness on the Diffuser Flow in a Transonic Centrifugal Compressor Stage</b> .....	867
<i>N. Bulot, I. Trébinjac</i>	
<b>Unsteady Pressure Measurement in Water-Flow Experiment of Turbopump</b> .....	877
<i>T. Motomura, H. Kure, N. Yamanishi, S. Hori</i>	
<b>Time-Frequency Characterization of Rotating Instabilities in a Centrifugal Pump with a Vaned Diffuser</b> .....	884
<i>G. Pavesi, G. Cavazzini, G. Ardizzon</i>	
<b>Effect of Impeller and Volute Design on the Performance of a Miniature Rotary Shaft Pump (RSP)</b> .....	894
<i>G. Pavesi, G. Ardizzon, A. Rossetti</i>	
<b>Interaction Between Uneven Cavity Length and Shaft Vibration at the Inception of Synchronous Rotating Cavitation</b> .....	904
<i>Y. Yoshida, Y. Kazami, K. Nagaura, M. Shimagaki, Y. Iga, T. Ikohagi</i>	
<b>New Prospects for Seaborne Electric Propulsive Powers on Basis of Podded Propulsors Applications</b> .....	911
<i>Jan Kanar</i>	
<b>Numerical Investigation on the Performance of a Savonius Wind Turbine</b> .....	922
<i>M. Torresi, A. Bressi, S.M. Camporeale, B. Fortunato</i>	
<b>An Investigation of Wake Interaction Effects on Unsteady Flows Over Blading</b> .....	933
<i>J.P. Gostelow, R.L. Thomas, D.S. Adebayo</i>	
<b>An Optimization Method for Centrifugal Pump Impellers</b> .....	944
<i>R.W. Westra, N.P. Kruyt, K. Van Andel, H.W.M. Hoeijmakers</i>	
<b>Numerical Simulation of Film Cooling Effectiveness on Flat Plate</b> .....	953
<i>Z. Tao, N. Liu, S.T. Ding, G.Q. Xu, H.W. Wu, J. Wen</i>	
<b>Shortening of the Shrouded Blade Numerical Tuning Cycle by Combining Different Modeling Methods</b> .....	964
<i>A.N. Arkhipov, A.V. Pipopulo, I.V. Putschkov</i>	
<b>Experimental Core Flow Instability in Wide Vaneless Diffusers</b> .....	972
<i>S. Ljevar, A. Dazin, P. Dupont, G. Caignaert, G. Bois, H.C. De Lange, A.A Van Steenhoven</i>	
<b>An Automated 3D FE Tool for Fast and Accurate Dynamic Assessment to Reduce Development Time for Compressor Blading</b> .....	980
<i>I.M.Fedorov, W.Kappis, I.V.Putschkov</i>	
<b>Thermal Behaviour of Large Hydro-Generators</b> .....	984
<i>M.Chaaban, J.Leduc, C.Hudon, D.N.Nguyen</i>	
<b>Procedure for the Axial Multistage Turbomachineries Performance Analysis</b> .....	991
<i>Giulio Croce, Enrico Dedicato, Renato Gazzano, Luca Ratto, Antonio Satta</i>	

### Volume 3

<b>Numerical Study of the Unsteady Cavitating Flow</b> .....	1003
<i>R. Campos-Amezcuca, F. Bakir, S. Khelladi, R. Rey</i>	
<b>Occurrence Range of a Rotating-Stall-Type Phenomemon in a High Head Liquid Hydrogen Inducer</b> .....	1012
<i>Masaharu Uchiumi, Kenjiro Kamijo+C136</i>	



<b>A Reduction Technique for Mistuned Bladed Disks with Superposition of Large Geometric Mistuning and Small Model Uncertainties</b> .....	1019
<i>Vladislav Ganine, Mathias Legrand, Christophe Pierre, Hannah Michalska</i>	
<b>H – Darrieus Wind Turbine with Blade Pitch Control</b> .....	1028
<i>I. Paraschivoiu, O. Trifu</i>	
<b>Analysis of Gas Turbine Rotating Cavities by a One-Dimensional Model</b> .....	1035
<i>L. Innocenti, M. Micio, R. Da Soghe, B. Facchini</i>	
<b>Optimisation of Turbine Blade Shroud and Under-Platform Dampers: Part 2- Numerical Predictions</b> .....	1048
<i>R. Elliott , S. Patsias, P. Doody</i>	
<b>Gas Turbine Power Augmentation by Inlet Air Fogging and Wet Compression-Technology Overview and Operating Experience</b> .....	1057
<i>M.A. Chaker, C.B. Meher-Homji</i>	
<b>Feeding Holes Air Flow Choke Effect on Dinamic Coefficient of an Air Bearing</b> .....	1072
<i>R. O. Ruiz, M. H. Di Liscia, S. E. Diaz</i>	
<b>A.C. Plasma Anemometer for Axial Compressor Stall Warning</b> .....	1080
<i>Eric H. Matlis, Thomas C. Corke, Joshua Cameron, Scott C. Morris</i>	
<b>Measurement of Cavitation Induced Strain on a 3 Bladed Inducer</b> .....	1091
<i>S.R. Sargent, K.P. Sorensen, R.D. Mcglynn</i>	
<b>The Effect of Guides on Circular Saw Vibration Characteristics</b> .....	1100
<i>Stanley G. Hutton</i>	
<b>The Design and Numerical Simulation of Two-Dimensional Flow Passage of Rotating-Ram Compression Rotor</b> .....	1106
<i>Han Ji-Ang, Zhong Jing-Jun, Yan Hong-Ming</i>	
<b>Friction Damping Analysis in Turbine Blades Using a User-Programmed Function in ANSYS</b> .....	1111
<i>R. Phadke, E. J. Berger</i>	
<b>Axial-Flow Gas Turbine Modeling with a 2-Dimensional Throughflow Calculation for Steady-State Analysis of Power Conversion System in a Gas-Cooled Reactor</b> .....	1119
<i>Ji Hwan Kim, Hee Cheon No+C148, Hyeun Min Kim</i>	
<b>Performance Evaluation of a Solar Driven Organic Rankine Cycle (ORC) with Different Working Fluids</b> .....	1127
<i>S. Brusca, R. Lanzafame, M. L. Lo Trovato, A. Tirrò</i>	
<b>Impact of a Skewed Inlet Boundary Layer and a Fillet on the Secondary Flow in a Compressor Cascade</b> .....	1137
<i>M. Hoeger</i>	
<b>Numerical and Emperical Prediction of the Mixed Flow Turbine Performance</b> .....	1149
<i>M. Abidat, M. Hamel, S. A. Litim</i>	
<b>An Advanced Microturbine System with Water Lubricated Bearings</b> .....	1155
<i>S. Nakano, T. Kishibe, T. Inoue, H. Shiraiwa</i>	
<b>The Importance of Component Maps for Gas Turbine Performance Simulations</b> .....	1165
<i>Joachim Kurzke</i>	
<b>Evaluation of the Use of the Adiabatic Wall Temperature to Predict Heat Fluxes for Film Cooled Turbine Airfoils</b> .....	1175
<i>Katharine L. Harrison, David G. Bogard</i>	
<b>Computation of Unsteady Heat Transfer on the Casing of a Turbine Blade</b> .....	1185
<i>Ali A. Ameri, Lamyaa El-Gabry</i>	
<b>The Rotor-To-Rotor Clocking Influence on Noise Reduction of a Two-Stage Turbine</b> .....	1188
<i>J.R. Blaszczak, E. Kus</i>	
<b>Contribution of Clocking Effects to the Multistage Turbine Performance Improvement</b> .....	1197
<i>A. Smolny, Kryszinski J., Blaszczak J.R.</i>	

<b>Cavitation in Single Vane Sewage Pumps</b> .....	1206
<i>P.U. Thamsen, T. Bubelach, T. Pensler, P. Springer</i>	
<b>Transition of Different Unsteady Cavitating Flows in 2D Cascade with Flat Blades</b> .....	1211
<i>Takashi Ohta, Takeo Kajishima</i>	
<b>Dynamic Coefficients for Squeeze Film Damper Using Full 3-D Navier Stokes Equation</b> ....	1218
<i>Changhu Xing, Minel J. Braun, Hongmin Li</i>	
<b>Flow Instabilities in Feather Seals Due to Upstream Harmonic Pressure Fluctuations</b> .....	1228
<i>D. Deng, M.J. Braun, R.C. Hendricks</i>	
<b>A General Purpose Test Facility for Evaluating Gas Lubricated Journal Bearings</b> .....	1235
<i>B. Ertas, M. Drexel, J. Van Dam, D. Hallman</i>	
<b>Numerical Study of a Bulb Hydraulic Turbine</b> .....	1245
<i>C.C.B. Santos, J.G. Coelho, A.C.P. Brasil Junior</i>	
<b>A Modal Based Substructure Method Applied to Nonlinear Rotordynamic Systems</b> .....	1252
<i>Helmut J. Holl</i>	
<b>Simulation and Validation of a Marine Propeller 5168 with an Arbitrary Mach Number Scheme</b> .....	1260
<i>Chunhua Sheng, Xiao Wang, Qiuying Zhao</i>	
<b>Preparation of Biomass-Gasification Product Gases for Fuel Synthesis by Catalytic Cleaning and Gas Filtration</b> .....	1267
<i>Frank Behrendt, Maria Gaggl, York Neubauer, Dorothea Männel, Wladimir Reschetilowski</i>	
<b>Forced Response of an Isolated Three-Dimensional Blade Under a Pulsating Freestream</b> .....	1274
<i>S.H. Cho, S.J. Song</i>	
<b>The Nonlinear Analysis of the Multiharmonic Forced Response of Coupled Turbine Blading</b> .....	1281
<i>C. Siewert, M. Krack, L. Panning, J. Wallaschek</i>	
<b>Possibilities of Simultaneous In-Cylinder Reduction of Soot and NO<sub>x</sub> Emissions for Diesel Engines with Direct Injection</b> .....	1292
<i>U. Wagner, U. Spicher, P. Eckert, S. Merkel, A. Velji</i>	
<b>Identification of Railway Wheel Defects in Time Signal &amp; Wavelet Transform</b> .....	1303
<i>S.K.Sinha, N.Dharmaraju, A.Rama Rao</i>	
<b>Aero-Acoustic Installation Effects in Cooling Fan Systems Part 1: Scattering by Surrounding Surfaces</b> .....	1314
<i>M. Roger, S. Moreau</i>	
<b>Aero-Acoustic Installation Effects in Cooling Fan Systems Part 2: Near-Field and Ground Effects</b> .....	1323
<i>S. Moreau, O. Marck, M. Roger</i>	
<b>Application of Gamma Code Coupled with Turbomachinery Models for High Temperature Gas-Cooled Reactors</b> .....	1333
<i>C.H. Oh, E.S. Kim, S. Sherman, J.H. Kim, H.C. No</i>	
<b>Reynolds-Stress Turbulence Modelling for Turbomachinery CFD</b> .....	1340
<i>G.A. Gerolymos, I. Vallet</i>	
<b>Transient Coupled Vibration Response of a Cracked Rotor</b> .....	1357
<i>A K Darpe, T H Patel</i>	
<b>A Numerical Analysis of Rotordynamic Fluid Forces on an Artificial Heart Pump Impeller in Whirling Motion</b> .....	1367
<i>Takayuki Suzuki, Koichi Yonezawa, Hironori Horiguchi, Tomonori Tsukiya, Yoshiyuki Taenaka, Yoshinobu Tsujimoto</i>	
<b>Numerical Turbulent Simulation and Experimentation of the Two-Phase Flow (Liquid/Gas) Through a Cascade of an Axial Pump</b> .....	1374
<i>Antonio Vidal, Orlando Aguillon, Frank Kenyery, Miguel Asuaje, Andrés Tremante</i>	

<b>An Experimental and Numerical Investigation of Jet Impingement on Ribs in an Airfoil Trailing-Edge Cooling Channel</b> .....	1380
<i>M.E. Taslim, G.J. Nicolas</i>	
<b>Effect of Periodic Unsteady Wake Flow and Turbulence Intensity on Heat Transfer of a Highly Loaded Turbine Blade</b> .....	1387
<i>M.T. Schobeiri</i>	
<b>Model-Updating for Vibrating Systems</b> .....	1402
<i>Peter Lancaster</i>	
<b>Halophytes Energy Feedstocks: Back to Our Roots</b> .....	1411
<i>R.C. Hendricks</i>	
<b>Potential Carbon Negative Commercial Aviation Through Land Management</b> .....	1422
<i>R.C. Hendricks</i>	
<b>Numerical Investigations of Fluid Structure Coupling: Oscillating Hydrofoil</b> .....	1429
<i>C. Münch, O. Braun, J.L- Kueny, F. Avellan</i>	
<b>Design of a Centrifugal Fan for Air Cushion Vehicle</b> .....	1438
<i>Y.T. Lee, V. Ahuja, A. Hosangadi, L. Mulvihill, R. Coleman, R. Birkbeck</i>	
<b>Theoretical Analysis of Thermodynamic Effect of Cavitation in Cryogenic Inducer Using Singularity Method</b> .....	1449
<i>S. Watanabe, A. Furukawa, Y. Yoshida</i>	
<b>Comparing Predicted and Tested Performance of Cryogenic Reaction Turbines Under Locked-Rotor Condition</b> .....	1457
<i>Christopher D. Finley</i>	
<b>Driving a Radial Magnetic Bearing with Three-Leg Voltage Converter</b> .....	1465
<i>Hyeong-Joon Ahn, Dong-Chul Han</i>	
<b>Development of a Sector Test Rig for Multistage Radial Compressor Stators</b> .....	1473
<i>M.B. Schmitz, A. Simpson, C. Aalburg, V. Michelassi</i>	
<b>Performance Analysis of Cryogenic Microturbines</b> .....	1482
<i>Roman Snytsar</i>	
<b>Cavitation Instability of a Two-Bladed Turbopump Inducer</b> .....	1485
<i>Kyoung-Hoon Lee, Min Seo, Shin-Hyoung Kang</i>	
<b>Observation and Analysis of Affinity Law Deviations Through Tested Performance of Liquefied Gas Reaction Turbines</b> .....	1487
<i>Sarah D. Alison-Youel</i>	
<b>A Computational Tool for the Analysis of Secondary Air Flow Network in Gas</b> .....	1495
<i>G.. Croce, R. Gazzano, L. Ratto, A. Satta</i>	
<b>A Reduced Order Model for Preliminary Design and Performance Prediction of Tapered Inducers</b> .....	1501
<i>Luca D'agostino, Lucio Torre, Angelo Pasini, Angelo Cervone</i>	

## Author Index