

73rd Annual AHS International Forum and Technology Display 2017 (AHS Forum 73)

The Future of Vertical Flight

**Fort Worth, Texas, USA
9 - 11 May 2017**

Volume 1 of 4

ISBN: 978-1-5108-4212-0

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.

Copyright© (2017) by American Helicopter Society International
All rights reserved.

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact American Helicopter Society International
at the address below.

American Helicopter Society International
2701 Prosperity Ave, Suite 210
Fairfax, VA 22031

Phone (703) 684-6777
Fax: (703) 739-9279

staff@vtol.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

ACOUSTICS

| | |
|---|-----|
| Helicopter Flight Procedures for Community Noise Reduction | 1 |
| <i>Eric Greenwood</i> | |
| Sound Diffraction Modeling of Rotorcraft Noise Around Terrain..... | 15 |
| <i>James H. Stephenson, Ben W. Sim, Subhashini Chitta, John Steinhoff</i> | |
| Evaluation of Aircrew Noise Exposure and Hearing Protection Solutions in CH-147F Chinook Helicopter Cabin..... | 28 |
| <i>Yong Chen, Sebastian Ghinet, Andrew Price, Viresh Wickramasinghe, Anant Grewal</i> | |
| Mechanism Analyses on Aeroacoustic Characteristics of Iced Rotor for Ice Detection..... | 39 |
| <i>Xi Chen, Qi-Jun Zhao, Yi-Yang Ma, Bo Wang</i> | |
| Identification of Spurious Signals from Permeable Ffowcs Williams and Hawkings Surfaces..... | 49 |
| <i>Leonard V. Lopes, D. Douglas Boyd Jr., Douglas M. Nark, Karl E. Wiedemann</i> | |
| Investigation of Rotor-Airframe Interaction Noise Associated with Small-Scale Rotary-Wing Unmanned Aircraft Systems..... | 66 |
| <i>Nikolas S. Zawodny, D. Douglas Boyd Jr.</i> | |
| A Laboratory Method for Assessing Audibility and Localization of Rotorcraft Fly-In Noise | 83 |
| <i>Stephen A. Rizzi, Andrew W. Christian, Menachem Rafaelof</i> | |
| A Permeable Self-adaptive Integration Surface for HSI Noise Prediction of Helicopter Rotor in Forward Flight | 95 |
| <i>Si-Yu Chen, Qi-Jun Zhao, Zheng Zhu, Yi-Yang Ma</i> | |
| Atmospheric Absorption Model Effects on Civil Rotorcraft Noise Certification EPNL Values..... | 104 |
| <i>Benjamin A. Goldman</i> | |
| Parametric Investigation on the Use of Lateral and Longitudinal Rotor Trim Flapping for Tiltrotor Noise Reduction..... | 111 |
| <i>Carlos Malpica</i> | |
| Drone Acoustics at Static Thrust Conditions | 126 |
| <i>Charles E. Tinney, Bryson Hill, John Valdez, Jayant Sirohi, Christopher Cameron</i> | |
| BLUECOPTER™ Demonstrator: The State-of-the-Art in Low Noise Design | 140 |
| <i>Sascha Schneider, Rainer Heger, Peter Konstanzer</i> | |

ADVANCED VERTICAL FLIGHT

| | |
|--|-----|
| Performance Measurements of UAV-Scale Cycloidal Rotor | 154 |
| <i>Adam J. Kellen, Moble Benedict</i> | |
| Design of a Maneuvering Marine Hydrokinetic Cycloturbine..... | 164 |
| <i>Margalit Goldschmidt, Michael Jonson, Joseph Horn, Richard Medvitz, Milo Feinberg</i> | |
| Advancement of the SNUF Blade Design through Flap Configuration Parametric Study and Optimization Framework | 175 |
| <i>WonJong Eun, JiSoo Sim, SangWoo Lee, SangJoon Shin</i> | |
| A Study in Reducing the Cost of Vertical Flight with Electric Propulsion..... | 187 |
| <i>Michael J. Duffy, Sean Wakayama, Ryan Hupp, Roger Lacy, Matt Stauffer</i> | |
| Design, Development and Flight Testing of a Novel Quadrotor Convertiplane Unmanned Air Vehicle | 205 |
| <i>A. Abhishek, M. Rama Krishna, Sourav Sinha, Joydeep Bhowmik, Debopam Das</i> | |
| Cormorant FanCraft™ UAS: Internal Rotor Technology Maturing..... | 219 |
| <i>Rafi Yoeli, Yitzchak D. Traeger</i> | |
| Experimental Studies Towards Understanding the Aeromechanics of a Flexible Robotic Hummingbird Wing in Hover..... | 229 |
| <i>David Coleman, Kanika Gakhar, Moble Benedict, Jason Tran</i> | |
| Control and Performance Analysis of a Reconfigurable Multi-Copter | 249 |
| <i>Robert Niemiec, Farhan Gandhi, Rajneesh Singh</i> | |
| Performance and Flowfield Measurements of a Meso-Scale Cycloidal Rotor in Hover | 266 |
| <i>Carl Runco, Brett Himmelberg, Moble Benedict</i> | |
| Linear Parameter Varying Models for the Optimization of Tiltrotor Conversion Maneuver | 280 |
| <i>Antonio Righetti, Vincenzo Muscarello, Giuseppe Quaranta</i> | |
| Bell V-280 Valor: A JMR-TD Program Update | 288 |
| <i>Ryan Ehlinger, Chris Gehler, Scott Allen</i> | |
| Runway Independent High Speed CarterCopter BizJet | 297 |
| <i>Jay Carter Jr., Jeffrey R. Lewis</i> | |
| Vortex Particle Analysis of Side-by-side Overlapping Rotors in Forward Flight..... | 304 |
| <i>Michael Avera</i> | |
| Design and Experimental Validation of a MAV-Scale Quad-Cyclocopter with All-Terrain Capability | 311 |
| <i>Elena Shrestha, Brian Davis, Vikram Hrishikeshavan, Inderjit Chopra</i> | |
| Experimental Evaluation of a Quadrotor Biplane with Variable Pitch Rotors | 325 |
| <i>Brandyn Phillips, Vikram Hrishikeshavan, Derrick Yeo, Inderjit Chopra</i> | |

| | |
|---|-----|
| Using Redundant Effectors to Trim a Compound Helicopter with Damaged Main Rotor Controls | 340 |
| <i>Jean-Paul Reddinger, Farhan Gandhi</i> | |

AERODYNAMICS

| | |
|--|-----|
| Generalized Aerodynamic Optimization of Hovering Coaxial Rotor Blades..... | 359 |
| <i>Keen Ian Chan</i> | |
| Computational Aerodynamic Modeling of Small Quadcopter Vehicles | 371 |
| <i>Seokkwan Yoon, Patricia Ventura Diaz, D. Douglas Boyd Jr., William M. Chan, Colin R. Theodore</i> | |
| Turbulence Modeling Strategies for Rotor Hub Flows..... | 387 |
| <i>James G. Coder, Philip A. Cross, Marilyn J. Smith</i> | |
| Dynamic Stall Experiments on a Rotor with High Cyclic Setting in Axial Inflow..... | 399 |
| <i>Till Schwermer, Anthony D. Gardner, Markus Raffel</i> | |
| Internal and Blade Surface Pressure Measurements of Centrifugal Flow Control on a Large Scale Rotor | 411 |
| <i>Peter F. Lorber, Brian Wallace, Mark W. Scott</i> | |
| Numerical Analysis of Dynamic Stall for Different Helicopter Rotor Flight Conditions..... | 424 |
| <i>François Richez</i> | |
| Active Flow Control Strategy on Improving Aerodynamic Characteristics of Rotor | 440 |
| <i>Yi-Yang Ma, Qi-Jun Zhao, Bo Wang</i> | |
| Structured, Overset Simulations for the 1st Rotor Hub Flow Workshop..... | 451 |
| <i>James G. Coder, Norman F. Foster</i> | |
| First Rotor Hub Flow Prediction Workshop Experimental Data Campaigns and Computational Analyses | 461 |
| <i>Sven Schmitz, David Reich, Marilyn J. Smith, Louis R. Centolanza</i> | |
| Experimental and Computational Studies to Understand Unsteady Aerodynamics of Cycloidal Rotors in Hover at Ultra-low Reynolds Numbers | 477 |
| <i>Carolyn M. Walther, David A. Coleman, Moble Benedict, Vinod Lakshminarayanan</i> | |
| A Computational Fluid Dynamics Based Viscous Vortex Particle Method for Coaxial Rotor Interaction Calculations..... | 496 |
| <i>Puneet Singh, Peretz P. Friedmann</i> | |
| Comparison of Advanced RANS Modeling with Dual-Plane PIV Measurements for a Hovering Rotor | 504 |
| <i>Zachary Lietzau, Manikandan Ramasamy, Rohit Jain, J. Gordon Leishman, John Ekaterinaris</i> | |
| Computational Analysis and Flow Physics of a Ducted Rotor in Edgewise Flight | 524 |
| <i>Matthew Misiorowski, Farhan Gandhi, Assad A. Oberai</i> | |
| Synchronized Flow Control of Dynamic Stall Under Coupled Pitch and Freestream Oscillations | 542 |
| <i>Jeffrey P. Bons, Matthew W. Frankhouser, James W. Gregory</i> | |
| Navier-Stokes Simulation of UH-60A Rotor/Wake Interaction Using Adaptive Mesh Refinement..... | 556 |
| <i>Neal M. Chaderjian</i> | |
| Line-Based Unstructured/Structured Heterogenous CPU/GPU Framework for Complex Aerodynamic Flows | 576 |
| <i>Yong Su Jung, Dylan Jude, Bharath Govindarajan, James Baeder</i> | |
| Assessment of CREATE™-AV Helios for Complex Rotating Hub Wakes | 597 |
| <i>Mark Potsdam, Philip Cross, Matthew Hill</i> | |
| Three-Dimensional Effects on Dynamic Stall of Rotor Airfoil..... | 609 |
| <i>Qing Wang, Qijun Zhao, Jiangli Yin, Bo Wang</i> | |
| A New Actuator Surface Model with Improved Wake Model for CFD Simulations of Rotorcraft..... | 620 |
| <i>Daniel Linton, George Barakos, Ronny Widjaja, Ben Thorner</i> | |
| Implementation of High-Order Methods in the HMB CFD Solver | 630 |
| <i>Antonio Jimenez-Garcia, George Barakos</i> | |
| Analysis and Testing of Boundary-Layer-Ingesting Pusher Propeller for High Speed Rotorcraft | 649 |
| <i>Blake Moffitt, Patrick Bowles, Jongwook Joo, Byung-Young Min, Brian Wake</i> | |
| Large Eddy Simulation of Flow Over an Airfoil Undergoing Surging and Pitching Motions | 662 |
| <i>Alexander Kocher, Reed Cummings, Onkar Saini</i> | |
| The Effect of Laminar Flow on Rotor Hover Performance..... | 673 |
| <i>Austin D. Overmeyer, Preston B. Martin</i> | |
| Numerical Study of Retreating Side Blowing Concept for a Rotor in High Speed Flight..... | 692 |
| <i>Byung-Young Min, Peter F. Lorber, Charles R. Berezin, Brian E. Wake, Mark W. Scott</i> | |
| PIV Flow Field Measurements of Hovering Rotors with Leading-Edge Protuberances..... | 710 |
| <i>Brian Cully, Joseph Milluzzo, Scott Drayton</i> | |
| High-Performance-Rotor Aerodynamic Testing..... | 724 |
| <i>Mark W. Scott, Mathew Thomas</i> | |
| Passive Flow Control of Dynamic Stall via Surface-based Trapped Vortex Generators | 735 |
| <i>Khider Al-Jaburi, Daniel Feszt</i> | |

VOLUME 2

| | |
|--|-----|
| Analysis of Download and Rotor/Airframe Interactions in Hover | 754 |
| <i>Todd R. Quackenbush, Glen R. Whitehouse, Benjamin S. Silbaugh, Pavel V. Danilov</i> | |

AIRCRAFT DESIGN

| | |
|---|-----|
| Design, Development, and Closed-loop Flight-Testing of a Single Power Plant Variable Pitch Quadrotor Unmanned Air Vehicle..... | 769 |
| <i>A. Abhishek, Ramdas Gadekar, Ankur Duhoon, Mangal Kothari, Shashikant Kadukar, Lokesh Rane, Ganesh Suryavanshi</i> | |
| Personal Rotorcraft Design and Performance with Electric Hybridization..... | 784 |
| <i>Christopher A. Snyder</i> | |
| Method for Estimating Inertial Properties of Rotorcraft in Conceptual Design | 794 |
| <i>Andrew Gallaher</i> | |
| Probabilistic Methodology for Multi-Fidelity Model-Based Robust Preliminary Design of Rotorcraft..... | 808 |
| <i>Dominik Wirth, Manfred Hajek</i> | |
| Individual Blade Control for Rotorcraft Using Mechanically Programmable Displacement Control..... | 823 |
| <i>Carlos A. Fenny</i> | |
| Design of Small Rotors for Multicopter UAS | 842 |
| <i>Nathan Beals</i> | |
| Exploring the Power Balance of Main Rotor Primary Control | 852 |
| <i>Uwe T. P. Arnold, Willem Garre, Manfred Hajek</i> | |
| ONERA and DLR Contributions to Improve Environmental Friendliness of Rotorcraft | 863 |
| <i>Klausdieter Pahlke, Blanche Demaret</i> | |
| The 505 Low Vibration Solution..... | 882 |
| <i>Peter Q. Romano, Michael S. Seifert, Michael R. Smith</i> | |
| Bell V-280 Valor Hydraulic System Optimization for Accelerated Development | 890 |
| <i>Robert Reynolds, Carl Elving</i> | |
| Development and Flight Testing of the Gamera-S Solar Powered Helicopter | 898 |
| <i>Scott Jordan, Tyler DeGraw, Michelle Mahon, George Murphy, Inderjit Chopra, V. T. Nagaraj</i> | |

AVIONICS AND SYSTEMS

| | |
|--|-----|
| Model Based Engineering for Advanced Integrated Modular Avionics - Focus and Challenges | 910 |
| <i>Thomas Gaska, Marilyn Gaska, Doug Summerville, Yu Chen</i> | |
| Assessment of Ship Landing Assist System in Maritime Helicopter Operation..... | 926 |
| <i>Shuhei Takahashi, Rie Ishii, Hiroaki Kono, Takeshi Matsuda</i> | |
| Benefits and Limitations of Reliance on an Open Architecture Technical Standard to Meet Expectations of an Open System..... | 932 |
| <i>Thomas A. DuBois, Scott A. Wigginton, Michael C. Orlovsky, William P. Kinahan</i> | |
| Open Ethernet-Based Embedded Platforms for Integrated Modular Architectures and Autonomous Systems..... | 943 |
| <i>Mirko Jakovljevic, Alvaro Soares</i> | |

CRASH SAFETY

| | |
|---|------|
| Development of a Continuum Damage Mechanics Material Model of a Graphite- Kevlar® Hybrid Fabric for Simulating the Impact Response of Energy Absorbing Subfloor Concepts | 951 |
| <i>Karen E. Jackson, Edwin Fasanella, Justin D. Littell</i> | |
| Comparison of the Hybrid II, FAA Hybrid III, and THOR-NT in Vertical Impacts | 963 |
| <i>Amanda M. Taylor, David M. Moorcroft, Richard L. DeWeese</i> | |
| Civil Rotorcraft Crash-Resistant Fuel System Performance | 974 |
| <i>Marvin Richards</i> | |
| Lightweight Exoskeleton Fuel Bladder Transition | 983 |
| <i>Kenneth Heater, Bryan Pilati, Matt Whipple</i> | |
| Dynamic Performance Assessment of Side Facing Troop Seats During Impact | 996 |
| <i>Nathan Wright, Chris Burneka</i> | |
| Demonstration of Aviation Mishap Reconstruction with On-Board Crash Recording Technologies | 1007 |
| <i>Brandon Hall, Robert Willis, Lindley Bark</i> | |

CREW STATIONS AND HUMAN FACTORS

| | |
|--|------|
| Evaluation of Aircrew Whole-Body Vibration and Mitigation Solutions for Helicopter Flight Engineers | 1015 |
| <i>Yong Chen, Upekha Senarat Yapa, Andrew Price, Viresh Wickramasinghe</i> | |
| Degraded Visual Environment Mitigation (DVE-M) Program, Yuma 2016 Flight Trials in Brownout..... | 1025 |
| <i>Zoltan Szoboszlay, Bradley Davis, Brian Fujizawa, Joe Minor, Michael Osmon, Zachariah Morford</i> | |
| Degraded Visual Environment Operational Levels..... | 1045 |
| <i>Stephen J. Fenley, Daniel Graham, Rick Gideonse</i> | |
| Pilot Head and Neck Response to Helicopter Whole Body Vibration and Head-Supported Mass | 1054 |
| <i>Andrew J. Law, Heather E. Wright Beatty, Jocelyn Keillor, Viresh Wickramasinghe</i> | |
| Characterization of Pilot Technique | 1063 |
| <i>Edward Bachelder, Bimal Aponso, Martine Godfroy</i> | |

| | |
|---|------|
| 3D-Sonification for Obstacle Avoidance in Brownout Conditions..... | 1077 |
| <i>M. Godfroy-Cooper, J. D. Miller, Z. Szoboszlay, E. M. Wenzel</i> | |

DYNAMICS

| | |
|---|------|
| A Closer Look at the Impact of Helicopter Vibrations on Ride Quality..... | 1101 |
| <i>Tobias Rath, Walter Fichter</i> | |
| Experimental Validation of Multi-Mode Tailboom Passive Vibration Control Using Fluidic Flexible Matrix Composite Tubes | 1117 |
| <i>Matthew Krott, Edward C. Smith, Christopher D. Rahn</i> | |
| Investigation of Engine-Airframe Vibration Due to Main Rotor Hub Loads Using a Substructuring Framework..... | 1128 |
| <i>Stacy Sidle, Ananth Sridharan, Inderjit Chopra, Matt Feshler, Peter Kull</i> | |
| Nonlinear Aeroelastic Coupled Trim Analysis of a Cyclocopter in Hover | 1145 |
| <i>Atanu Halder, Moble Benedict</i> | |
| Performance and Loads Study of a High-Speed Compound Helicopter..... | 1162 |
| <i>Graham Bowen-Davies, Hyeonsoo Yeo</i> | |
| Comparison of CAMRAD II and RCAS Predictions of Tiltrotor Aeroelastic Stability..... | 1186 |
| <i>Hyeonsoo Yeo, Jeffrey Bosworth, C. W. Acree Jr., Andrew R. Kreshock</i> | |
| Comparison of Calculated and Measured Blade Loads of the Tilt Rotor Aeroacoustic Model (TRAM) | 1203 |
| <i>Jimmy C. Ho, Hyeonsoo Yeo</i> | |
| High-fidelity, 3D Stress Prediction for Composite Rotor Blades | 1226 |
| <i>Shilei Han, Olivier A. Bauchau</i> | |
| Proprotoor Loads and Whirl-Flutter Stability of a Tiltrotor Wind Tunnel Model..... | 1234 |
| <i>Christian Hoover, Jinwei Shen, Hao Kang, Andrew R. Kreshock</i> | |
| Optimization of Circular Force Generator Placement for Rotorcraft Hub Force and Moment Cancellation..... | 1248 |
| <i>Keerti Prakash, George A. Lesieutre</i> | |
| Tiltrotor Whirl Flutter Stability Augmentation Using Active Wing Tips | 1259 |
| <i>Matthew W. Floros, Hao Kang</i> | |
| Novel Approach to Interaction Between Engine-Drive Train System and Deformable Rotorcraft Airframes..... | 1269 |
| <i>Vincenzo Muscarello, Luigi Cocco, Marco Favale, Pierangelo Masarati, Giuseppe Quaranta</i> | |
| Dynamic Wake Inflow Modeling in Ground Effect for Flight Dynamics Applications | 1282 |
| <i>Massimo Gennaretti, Claudio Pasquali, Felice Cardito, Jacopo Serafini, Giovanni Bernardini, Roberto Celi</i> | |
| Parallel Implementation of Comprehensive Rotor Dynamics Simulation Based on the Motion Formalism..... | 1294 |
| <i>Valentin Sonnevile, Olivier A. Bauchau</i> | |
| Capability for Fully Integrated Aeroelastic Simulation of Complete Vertical Lift Configurations | 1301 |
| <i>Nicolas D. Reveles, Eric L. Blades, Noah A. Bern, Marilyn J. Smith</i> | |
| RPM Driven Extension-Torsion Coupled Self-Twisting Rotor Blades | 1315 |
| <i>Elizabeth Ward, Inderjit Chopra, Anubhav Datta</i> | |
| Measurement of Transient Loads and Blade Deformation in a Coaxial Counter-Rotating Rotor | 1334 |
| <i>Christopher Cameron, Jayant Sirohi, Roland Feil, Jürgen Rauleider</i> | |
| Effect of Elastic Blade Deformation on Trim and Vibratory Loads of a Quadcopter | 1346 |
| <i>Robert Niemiec, Farhan Gandhi</i> | |
| Loads Prediction for a Gimbaled Tiltrotor in Conversion Flight Using CAD-Based 3-D Structural Analysis Models | 1360 |
| <i>William Staruk, Inderjit Chopra, Anubhav Datta</i> | |

HANDLING QUALITIES

| | |
|---|------|
| Towards Handling Qualities Requirements for High-Speed Compound Rotorcraft | 1383 |
| <i>Joseph F. Horn, Adam Thorsen, Angelina Conti</i> | |
| Development and Evaluation of New High-Speed ADS-33 Mission Task Elements using a Tiltrotor Platform..... | 1397 |
| <i>Roy Brewer, Frank Conway, Ray Mulato</i> | |
| Flight Testing of Coupled Collective toward Reducing Pilot Workload During Landing in DVE | 1404 |
| <i>Jeff Lusardi, Brian Fujizawa, Zachariah Morford</i> | |
| Pilot Control Behavior Model and its Model-Matching Procedure Via Mission-Task-Element Flight Tests | 1413 |
| <i>Can Onur, Umut Tiire, Onur Akin, Ugur Zengin</i> | |
| Parameter Optimization of Dynamic Inversion Control Laws for Shipboard Operations | 1420 |
| <i>Joseph F. Horn, Junfeng Yang, Dooyong Lee, Chengjian He</i> | |
| Interpreting Time-Frequency Analyses of Pilot Control Activity in ADS-33E Mission Task Elements | 1434 |
| <i>John K. Tritschler, John C. O'Connor, John M. Holder, David H. Klyde, Amanda K. Lampton</i> | |
| Handling Qualities Assessment of a Pilot Cueing System for Autorotation Maneuvers | 1471 |
| <i>Jonathan Rogers, Laura Strickland, Caroline Repola, Michael Jump, Neil Cameron, Thomas Fell</i> | |
| Investigation and Evaluation of Control Design Requirements for Future Personal Aerial Vehicles..... | 1483 |
| <i>Carlo A. Gerboni, Stefano Geluardi, Fichter, Walter, Heinrich H. Bilthoff</i> | |
| Development and Simulation Testing of High-Speed Evasive and Attack MTEs for Rotorcraft Handling Qualities Evaluation..... | 1495 |
| <i>Cody E. Fegeley, William C. Fell, Carl R. Ott, Hong Xin, Chris L. Blanken</i> | |

| | |
|---|------|
| Neural Network and Machine Learning Allocation of Redundant Controls for Power Optimization on a Compound Helicopter | 1507 |
| <i>Jean-Paul Reddinger, Farhan Gandhi</i> | |

VOLUME 3

HEALTH AND USAGE MONITORING SYSTEMS (HUMS) – CONDITION BASED MAINTENANCE (CBM)

| | |
|--|------|
| Regime Recognition Accuracy | 1520 |
| <i>Jason Hull, Jeffrey Monaco, Mark Davis, Raymond Beale, Roberto Semidey, Mark Glucksman-Glaser</i> | |
| Joint Military and Commercial Rotorcraft Mechanical Diagnostics Gap Analysis | 1531 |
| <i>Daniel Wade, Brian Tucker, Mark Davis, Doug Knapp, Sophie Hasbroucq, Moreno Saporiti, Malcom Garrington, Alexander Rudy</i> | |
| Data-Driven Classification of CH-146 Manoeuvres Using MEMS-IMU Sensor System | 1546 |
| <i>Catherine Cheung, Alejandro Lehman Rubio, Julio J. Valdés</i> | |
| Reconstructing Spectra from IVHMS Condition Indicators..... | 1557 |
| <i>Andrew W. Wilson, Daniel R. Wade</i> | |
| Flight Testing of Health Management Technologies | 1563 |
| <i>Andrew Brookhart, Mark Davis, Preston Bates, Jim Cycon, Chris Lyman, Paul Pantelis, Treven Baker, Nathaniel Bordick</i> | |
| Simulation Study and Degradation Test of Fluid Dampers Equipped with HUMS | 1576 |
| <i>Iman Shahosseini, John Nall</i> | |
| Condition (Usage) Based Maintenance & SLL Computation Using Flight Regime Recognition Algorithm..... | 1583 |
| <i>Emmanuel Laillet, Pierre-Loïc Maisonneuve, Damien Reveillon</i> | |
| Development and Application of a Hybrid System for Continuous Monitoring of Aircraft Gross Weight..... | 1596 |
| <i>Garrett Argenna, Mark Davis, Andrew Brookhart, Ray Beale</i> | |
| Study on the Impact of Post-Flight CBM Reporting on Readiness and Maintenance Metrics | 1606 |
| <i>Erica Scates, Brian Fuller, John Bullock</i> | |
| Enhanced Safety Management and Risk Mitigation through Robust HFDM | 1619 |
| <i>Eric Bechhoefer, Michael Augustin</i> | |
| Wear Sensors for Pitch Control Bearing Condition Based Maintenance | 1628 |
| <i>Brandy D. Lewis, Brian E. Tucker</i> | |
| Integrated Hybrid Structural Management System (IHSMS) - Usage and Loads Monitoring | 1638 |
| <i>Brian LeFevre, Mark Davis, Conor Marr, David Rusk, Courtney Johnson</i> | |
| Integrated Hybrid Structural Management System (IHSMS) - Aircraft Impact Monitoring | 1652 |
| <i>Eric Schenck, Mark Davis, Raymond Bond, Janette Meyer, David Rusk</i> | |
| Component Life Management Using HUMS Data and Probabilistic Structural Integrity | 1661 |
| <i>Preston R. Bates, Avinash Sarlashkar, Mark W. Davis, Mark R. Gurvich, Nathaniel E. Bordick, Jay P. Kiser</i> | |

HISTORY

| | |
|--|------|
| Larsen's Goon' — The Forgotten History of Pitcairn's PA-36 Autogiro | 1672 |
| <i>Bruce H. Charnov</i> | |
| Historical Overview of the Civil Aerospace Medical Institute's Biodynamics Facility | 1699 |
| <i>Amanda Taylor, Richard DeWeese</i> | |
| An Interview with General Richard A. Cody: The Soldiers' General and His Enduring Impact on Army Aviation | 1710 |
| <i>Paul J. Fardink</i> | |
| Red China's First Helicopter: "Yan-An 2" | 1740 |
| <i>Jacques Virasak</i> | |

MANUFACTURING TECHNOLOGY AND PROCESSING

| | |
|--|------|
| Topology Optimization in Additive Manufacturing..... | 1752 |
| <i>Radoslaw Wojtuszewski, Aleksander Banas</i> | |
| Thick-Walled Composite Cylinder Fabrication to Support Composite Rotor Shaft Development for CH-47 Chinook..... | 1760 |
| <i>Patrick R. Darmstadt, Anthony Hendrickson, Jeron Moore, Kelli Barbato, Robert Vitlip, Zhenning Hu</i> | |
| Portable Bonding System..... | 1770 |
| <i>Mark A. Tuscano</i> | |
| Additive Manufacturing of Simulator Parts | 1776 |
| <i>Paul Shields</i> | |
| Simulation of Spiral Bevel Gear Tooth Manufacturing to Aid in One Piece Gear Shaft Design | 1783 |
| <i>Scott R. Davidson, Christopher C. Pierce</i> | |
| SB>1 Defiant™ Joint Multi-Role Technology Demonstrator: The Way Forward for Rotorcraft Manufacturing | 1789 |
| <i>Jessica Newman, Forster, William, Christopher Gatley, Thomas R. Pinney, Jeff Kinlan, Anshuman Bappa Saha</i> | |
| Affordable Design and Manufacturing of the V-280 Wing..... | 1805 |
| <i>Ryan Decker, Andrew Baines, Dave Carlson, James Kooiman, Keith Stanney, Doug Wolfe</i> | |

MODELING AND SIMULATION

| | |
|--|------|
| Analysis of Motion Parameter Variations for Rotorcraft Flight Simulators..... | 1812 |
| <i>Michael Jones, Mark White, Thomas Fell, Miles Barnett</i> | |
| ACT/FHS System Identification Including Rotor and Engine Dynamics..... | 1834 |
| <i>Susanne Seher-Weiß</i> | |
| State-Space Inflow Model Identification from Viscous Vortex Particle Method for Advanced Rotorcraft Configurations | 1846 |
| <i>Chengjian He, Monica Syal, Mark B. Tischler, Ondrej Juhász</i> | |
| Extending the Objective Motion Cueing Test to Measure Rotorcraft Simulator Motion Characteristics | 1876 |
| <i>Wouter Dalmeijer, Ivan Miletovic, Olaf Stroosma, Marilena Pavel</i> | |
| Closed-Loop Rotorcraft System Identification Using Generalized Binary Noise | 1892 |
| <i>Johannes Wartmann</i> | |
| Parametric Study of Dynamic Inflow for Coaxial Rotor System..... | 1904 |
| <i>Omri Rand, Vladimir Khromov</i> | |
| The Use of Pilot Ratings in Rotorcraft Flight Simulation Fidelity Assessment..... | 1918 |
| <i>D. M. Miletovic, I. Pool, O. Stroosma, M. D. Pavel, M. Wentink, M. Mulder</i> | |
| Development of a Finite State Dynamic Inflow Model for Coaxial Rotor Using Analytical Methods..... | 1932 |
| <i>Yong-Boon Kong, J. V. R. Prasad, David Peters</i> | |
| Accurate Real-Time Extensible Simulations of Dynamic Bodies..... | 1943 |
| <i>Nicholson K. Koukpaizan, Jagadeesh Movva, Marin Butori, Marilyn J. Smith</i> | |
| Shape Sensing and Structural Health Monitoring of Rotor Blades from Strain Analysis..... | 1962 |
| <i>Giovanni Bernardini, Roberto Porcelli, Pierangelo Masarati, Jacopo Serafini</i> | |
| A Free Wake Linear Inflow Model Extraction Procedure for Rotorcraft Analysis | 1972 |
| <i>Jeffrey D. Keller, Robert M. McKillip Jr., Daniel A. Wachspress, Mark B. Tischler, Ondrej Juhász</i> | |
| Overview of Bird Strike Modelling, Testing and Certification Approaches in Airbus Helicopters | 1990 |
| <i>Alice Vagnot, Florent Boyer, Johannes Markmiller</i> | |
| State-Space Inflow Model Identification and Flight Dynamics Coupling for an Advanced Coaxial Rotorcraft Configuration | 1996 |
| <i>Sean Hersey, Roberto Celi, Ondrej Juhász, Mark B. Tischler, Omri Rand, Vladimir Khromov</i> | |
| Aeroelastic Analysis for Highly Flexible Flapping Wing in Hover | 2014 |
| <i>Xuan Yang, Aswathi Sudhir, Atanu Halder, Moble Benedict</i> | |
| Development and Validation of an Engineering Simulation Model in FLIGHTLAB with Customized Modeling Enhancements | 2033 |
| <i>Chi Zhang, Hong Xin, Joseph Driscoll</i> | |
| Helicopter Turbulence Modeling with Accurate Spatial Correlations for Handling-Quality Analysis | 2049 |
| <i>Honglei Ji, Renliang Chen</i> | |
| Analytic Tool Correlation Status for the Joint Multi-Role Technology Demonstrator Program | 2065 |
| <i>Nick Tuozzo, Eric Fox, Erez Eller, Bryan Mayrides, Thomas A. Zientek, Peter Lorber, Robert P. Narducci, Taylor Sproul</i> | |
| Coupled CFD/CSD Study of a Flexible MAV-Scale Flapping Wing in the Hover Flight Condition | 2081 |
| <i>James L. Lankford, Inderjit Chopra</i> | |
| Design of a Haptic Helicopter Trainer for Inexperienced Pilots | 2097 |
| <i>Davide Fabbri, Stefano Geluardi, Carlo A. Gerboni, Mario Olivari, Giulia D'Intino, Lorenzo Pollini, Heinrich H. Bühlhoff</i> | |
| High-Fidelity Simulations of the Interaction of Atmospheric Turbulence with Ship Airwakes | 2109 |
| <i>Regis Thedin, Michael P. Kinzel, Sven Schmitz</i> | |
| Simulation of Pitching Moment and Drag by a State-Space Dynamic Stall Model — Experimental Correlation | 2123 |
| <i>Michael Malick, David A. Peters</i> | |
| Multibody Modeling Extensions Supporting Enhanced Aircraft Simulations..... | 2144 |
| <i>Robert McKillip Jr., Todd Quackenbush</i> | |

OPERATIONS

| | |
|---|------|
| Control Engineering Approach in Safety Management Systems..... | 2155 |
| <i>Victor Girondin, Stephane Morel</i> | |
| Development of a Helicopter Sling Load Unmanned Hookup Device | 2161 |
| <i>Kevin Connolly, Marc Tardiff, George Matook</i> | |
| The Evolution of Heavy-Lift Operations Performed by Tandem Rotor Helicopters at Columbia Helicopters | 2179 |
| <i>Anna Royce, Elle Johnson, Daniela Makowski</i> | |
| An Investigation of Emergency Flight Operations with Vertical Flight Aircraft in Class B Airspace | 2187 |
| <i>Kaydon A. Stanzione, Michael Baiada, Richard Ruff</i> | |
| Assessment of Processes and Risks Associated with Extension of Inspection Intervals | 2194 |
| <i>David L. Green, Harrison H. Chin, Richard Barnett</i> | |
| Integrated Discrete-Event Simulation Environment for Analysis of Rotorcraft Reliability, Availability, and Maintainability | 2201 |
| <i>Joshua K. Price, Sylvester Ashok, Ryan Armstrong, Kyle B. Collins, Dimitri Mavris, Daniel Schrage</i> | |

PRODUCT SUPPORT SYSTEMS TECHNOLOGY

| | |
|---|------|
| Cold Spray Processing and Repair Design for Helicopter Components | 2214 |
| <i>James Sullivan, Christopher Howe, Jinkyu Choi</i> | |
| Demand Forecasting: Cross-Functional, Cross-Disciplinary Analytics | 2220 |
| <i>Ping Liu</i> | |
| RFID Tag Implementation on Bell 525 | 2226 |
| <i>Cleve McFarlane, Brian Tucker, Dennis Slatton</i> | |

PROPELLSION

| | |
|--|------|
| Preparing for the U.S. Army's Improved Turbine Engine | 2233 |
| <i>Ben Plummer, Joan Smith, Casey Carter</i> | |
| HCE Kerosene Piston Engine Light Helicopter Demonstrator Results | 2242 |
| <i>Christian Mercier, Alexandre Gierczynski</i> | |
| Hybrid Gear Performance Under Loss-of-Lubrication Conditions | 2250 |
| <i>Kelsen E. LaBerge, Stephen P. Berkebile, Robert F. Handschuh, Gary D. Roberts</i> | |
| Experimental and Numerical Investigation of Lubricant Retention on a Rotating Disc and Gear Teeth | 2257 |
| <i>Ranadip Acharya, Huan Zhang, Zaffir Chaudhry, John Maglieri, Bruce Thompson</i> | |
| Experimental Investigation of Shrouding on Meshed Spur Gear Windage Power Loss | 2267 |
| <i>Irebert Delgado, Michael Hurrell</i> | |
| Computational Investigation and Design Study of Adaptive Axial-Flow Turbomachinery Rotor Blade | 2276 |
| <i>Muthuvel Murugan, Anindya Ghoshal, Luis Bravo, Fei Xu, Ming-Chen Hsu, Yuri Bazilevs, Kevin Kerner</i> | |

VOLUME 4

| | |
|---|------|
| Flow and Heat Transfer Simulation in a Splash Lubricated Bell 525 Accessory Gearbox | 2285 |
| <i>Siddhartha Mukherjee, Russell Mueller, Mukundhan Chakram</i> | |
| Hybrid Ceramic Bearing Fatigue Testing for the Future Advanced Rotorcraft Drive System Program | 2295 |
| <i>Cody Anderson, Roozbeh Kiamanesh, Lars Ponten, Jason Fetty, Treven Baker</i> | |
| The Road to First Flight: Development of the CH-53K Drive System | 2305 |
| <i>Peter X. Palcic, Shulin He, Yury Gmirya, Leslie Leigh</i> | |
| Engine Inlet Performance Analysis for the V-280 Demonstrator | 2317 |
| <i>Brad Henson</i> | |
| Future Advanced Rotorcraft Drive System (FARDS) Full Scale Gearbox Demonstration | 2325 |
| <i>Andrea Chavez, Treven Baker, Jason Fetty</i> | |
| Lightweight, Low-Cost, Damage-Tolerant, Highly Survivable Composite Drive Shaft for Helicopter Application | 2336 |
| <i>Harry R. Luzetsky, Ellen Phifer, John Michasiow</i> | |
| Ceramic Rolling Element Damage Sensitivity and Gearbox System Response | 2353 |
| <i>Bryan Allison, Tom Lunz, Kyle Monaghan, Mark Kozachyn</i> | |

SAFETY

| | |
|---|------|
| Reliability Analysis of a Rotorcraft Transmission Bolted Connection | 2362 |
| <i>James R. Allen II, Steven Rodriguez, Lawrence Pilkington</i> | |
| Experimental Based Numerical Studies of Bird Impact Response on Helicopter Horizontal Stabilizer | 2370 |
| <i>R. Vijayakumar, M. Lavakumar, R. Ravindranath, D. B. Chalwade</i> | |
| Aircraft Accidents: Investigating Human Error | 2377 |
| <i>Gary D. Braman</i> | |
| Rotorcraft Fastener Electrical Contact Analysis for Optimal Carbon Fiber Composite Lightning Strike Protection | 2382 |
| <i>Andreas Liebscher, Gregory Rizza, Wudhidham Prachumsri</i> | |
| Risk Assessment: Quantitative Versus Qualitative | 2391 |
| <i>John Hewitt, Loan Pham</i> | |
| Epidemiology of Helicopter Accidents: Inspection Blind Spots, Geographic Disparities, and Pilot Demographics | 2397 |
| <i>Katherine S. Zhang, Jared Churchwell, Joseph Homer Saleh</i> | |
| Epidemiology of Helicopter Accidents: Trends, Rates, and Covariates | 2414 |
| <i>Jared Churchwell, Katherine S. Zhang, Joseph Homer Saleh</i> | |

STRUCTURES AND MATERIALS

| | |
|--|------|
| Effects of Nanosilica on the Ballistic Impact Tolerance of Carbon/Epoxy Tubes Loaded in Torsion | 2436 |
| <i>Aniruddh Vashisth, Charles E. Bakis, Charles R. Ruggeri, Todd C. Henry, Gary D. Roberts</i> | |
| A Structural Perspective on U.S. Army Airworthiness Impacts Resulting from Changes in Rotorcraft Component Fatigue Strength, Loads, and Usage | 2445 |
| <i>Robert E. Benton Jr., Martin H. Rogers</i> | |
| A Modified Method of Deriving Fatigue Load Spectra from Historical Flight Test Data | 2464 |
| <i>Robert E. Benton Jr., Michael Chandler, Chad Appleton</i> | |

| | |
|--|------|
| Progressive Damage in Rotorcraft Composite Structures as Random Process: Integration of Characterization, Modeling and Validation | 2480 |
| <i>Mark R. Gurvich, SeungBum Kim, Mark E. Robeson</i> | |
| High Speed Impact Testing of Thermoplastic Composite Plates | 2495 |
| <i>Florian Franke, Uli Burger, Sebastian Heimbs, Christian Seidel, Patrik-Vincent Brudzinski, Dominic Huehn</i> | |
| Expedient Repair for Composite Rotorcraft Structure | 2507 |
| <i>Mark E. Robeson, Daniel V. Camp, Joseph A. Webb, Greg M. Mellema</i> | |
| Analysis and Test of Composite Rotorcraft Structure Subject to Ballistic Events | 2514 |
| <i>Clark Andrews, Lisa M. Chiu, Mark E. Robeson</i> | |
| The Most Recent Rules on Fatigue and Damage Tolerance - Application and Challenges at Airbus Helicopters | 2521 |
| <i>Stefan Emmerling, Elif Ahci-Ezgi, Jean-Marc Besson</i> | |
| Experimental Fatigue Life Quantification of the Effect of Blending Surface Damage on Shot-Peened Aluminum Specimens | 2532 |
| <i>Maxime Lapalme, Marc Ouellet, Guillaume Biron</i> | |
| Method to Assess the Effects of a Flaw with Residual Stress for Rotorcraft Metallic Structures | 2539 |
| <i>Balaji Rajagopal, W. Paul Green, Manjunatha M. Reddy, Xiaoming Li</i> | |
| Equivalent Level of Safety Methodology for Structural Usage Credit | 2545 |
| <i>Brian Tucker, Rick Muniz, Michael Neus, Paul Green, Leigh Altman, Alejandro Barbarin</i> | |
| Development of Allowables for Composite Wrinkles | 2558 |
| <i>Michael Burnett, Michael Dearman</i> | |
| Multifunctional Structural Composite with Integrated Electromagnetic Shielding | 2567 |
| <i>Harry R. Luzetsky, Martha A. Klein, Graham Ostrander</i> | |
| Development, Test, and Evaluation of Additively Manufactured Flight Critical Aircraft Components | 2577 |
| <i>Jan M. Kasprzak, Amber B. Lass, Charles E. Miller</i> | |
| A Coupled Isogeometric Analysis and Finite Element Approach for Accurate Response Prediction of a Complex Structure | 2586 |
| <i>Eugene Fang, Yicong Lai, Jim Liao, Yongjie Zhang, Nam Phan</i> | |
| A Hybrid Damage Modeling and Experimental Study of Composite Tee-joints Under Pull-off Loading | 2592 |
| <i>Xiaodong Cui, Xiang Ren, Jim Liao, Waruna Seneviratne, Nam D. Phan</i> | |
| Probabilistic Structural Integrity Framework for Composite Damage Tolerance | 2600 |
| <i>Alexander Q. Weintraub, Kenneth M. Furnes, Preston R. Bates, Mark R. Gurvich, Nathaniel E. Bordick, Jay P. Kiser</i> | |
| Progressive Fatigue Damage Simulation in Composites based on Explicit Finite Element Formulation | 2611 |
| <i>Yuri Nikishkov, Guillaume Seon, Andrew Makeev, Dean Nguyen</i> | |

SYSTEM ENGINEERING TOOLS/PROCESSES

| | |
|---|------|
| Modeling, Analysis, and Optimization of Rotorcraft and Fleet Availability | 2623 |
| <i>Salkath Bhattacharya, Vidhyashree Nagaraju, Bentolhoda Jafary, Karthik Katipally, Lance Fiondella, Eric Spero, Anindya Ghoshal</i> | |
| A Conceptual Framework Leading to Different Dynamic Systems Architectures | 2635 |
| <i>Chris Hartmann, Emmanuel Mermoz, Raphael Chenouard, Alain Bernard</i> | |
| Robust Hydraulic Filter Rated Using Dynamic Efficiency Test Method Will Increase Aircraft Reliability and Safety | 2644 |
| <i>Peter B. Rao</i> | |
| A Numerical Method to Calibrate and Forecast Technology Improvements for the UH-60 Helicopter Using NDARC | 2654 |
| <i>Etienne Demers Bouchard, Matthew L. Schmit, Kyle Collins, Dimitri Mavris</i> | |

TEST AND EVALUATION

| | |
|---|------|
| Very High Altitude Flight Testing of the H145 Helicopter | 2661 |
| <i>Carl Ockier, Christian Kolb, Adeline Berthe</i> | |
| Low-Speed Wind Tunnel Drag Test of a 2/5 Scale AH-64 Apache Door-Hinge Hub | 2672 |
| <i>Robert D. Vocke II, Gerardo Nuñez</i> | |
| Flight Evaluation of a Flexible Fabric Stabilizer for Sling Loads | 2689 |
| <i>Marc Tardiff, Daniel Nyren, Luigi Cicolani</i> | |
| Flight Testing of a Coaxial Ultralight Rotorcraft | 2706 |
| <i>Roland Feil, Markus Rinker, Manfred Hajek</i> | |
| Automatic Fatigue Test Control System (AFTCS) | 2720 |
| <i>Chi Ha, Mark Wright, Kimberly Malone, Chad Killeen, Albert DeWeese, Luke McBee, Gregory Freeman, Kameron Hawkins</i> | |
| Kalman Filter Estimation of Rotor-State Flapping: An Optimization-based Approach with UH-60 Flight Test Data | 2728 |
| <i>Marit E. Knapp, Christina M. Ivler, Marcos G. Berrios, Tom Berger, Mark B. Tischler</i> | |
| Using Wind Tunnel Tests to Investigate Dual Lift Trim, Maneuvers, Stability and Control | 2744 |
| <i>Reuben Raz, Omer Fogel, Aviv Rosen, Marcos G. Berrios, Luigi S. Cicolani</i> | |
| Wind Tunnel Testing for the SB>1 Defiant™ Joint Multi-Role Technology Demonstrator | 2760 |
| <i>Peter Lorber, Patrick Bowles, Eric Fox, Zhe Kevin Wang, Benjamin Hein, Bryan Mayrides</i> | |
| MH-60M Directional Control Margin Investigation | 2778 |
| <i>Jeffrey Von Hor, Allan Guess</i> | |

| | |
|---|------|
| Validation of Simulated Ship Air Wake Effects on Helicopter Recoveries..... | 2786 |
| <i>David Jarrett, Sylvain Manso</i> | |
| Experimental Investigation of Dynamic Stall on the SC1094R8 Airfoil and Comparison with Computational Predictions..... | 2798 |
| <i>Pourya Nikoueeyan, Tanner Harms, Jonathan Naughton, Vineet Ahuja, Enrico Fabiano, Mark Potsdam</i> | |
| Structural and Flight Test of a Composite Bubble Door for the CHI CH-47D..... | 2811 |
| <i>Lawrence Pilkington, Courtney Solem, Anna Royce</i> | |
| Characterization of Endevco Piezoresistive Sensors for Blade Pressure Measurements..... | 2817 |
| <i>Andrew Grizzle, Vikram Hrishikeshavan, Anand Saxena, Inderjit Chopra</i> | |
| Quantification of Swirl Recovery in a Coaxial Rotor System | 2828 |
| <i>Daiju Uehara, Jayant Sirohi</i> | |

UNMANNED VTOL AIRCRAFT AND ROTORCRAFT

| | |
|---|------|
| Design and Prototyping of a New Coaxial VTOL UAV Concept..... | 2841 |
| <i>Yuan Yao, Daniel P. Schrage</i> | |
| Framework for Attitude Controller Development Using Physics Based Flight Dynamics and Hardware-in-the-loop Simulation for Rotary Wing UAVs..... | 2852 |
| <i>Sagar Setu, Abhishek, C. Venkatesan</i> | |
| Comprehensive Analysis Modeling of Small-Scale UAS Rotors | 2865 |
| <i>Carl R. Russell, Martin K. Sekula</i> | |
| Slung Load Transportation by Multiple Rotary-Wing Vehicles | 2881 |
| <i>Svetlana Potyagaylo, Anton Cooper, Omri Rand</i> | |
| An Overview of the U.S. Army Aviation Development Directorate Quadrotor Guidance, Navigation, and Control Project..... | 2894 |
| <i>Kenny K. Cheung, Joseph A. Wagster IV, Mark B. Tischler, Christina M. Ivler, Marcos G. Berrios, Tom Berger, Ondrej Juhasz, Eric L. Tobias, Chad L. Goerzen, Patrick S. Barone, Frank C. Sanders, Mark J. S. Lopez, Rhys M. Lehmann</i> | |
| An Analysis of Classical and Alternate Hexacopter Configurations with Single Rotor Failure | 2913 |
| <i>Michael McKay, Robert Niemiec, Farhan Gandhi</i> | |
| Smooth Trajectory Optimization in Wind: First Results on a Full-Scale Helicopter..... | 2924 |
| <i>Vishal Dugar, Sanjiban Choudhury, Sebastian Scherer</i> | |
| Modeling, Analysis and Implementation of a Thrust Vectoring Bi- Rotor with Active Oblate Tilting..... | 2933 |
| <i>Juan-Pablo Afman, JVR Prasad, Michael Mayo, Courtland Bivens</i> | |
| Hover Flight Control Design for UAS Using Performance-based Disturbance Rejection Requirements..... | 2948 |
| <i>Marcos G. Berrios, Tom Berger, Mark B. Tischler, Ondrej Juhasz, Frank C. Sanders</i> | |
| Time-optimal Trajectory Planning for Landing Onto Moving Platforms | 2971 |
| <i>Botao Hu, Sandipan Mishra</i> | |
| Vision based Collaborative Localization for Swarms of Aerial Vehicles | 2980 |
| <i>Sai Vempala, Srikanth Saripalli</i> | |
| Testing and Characterization of Hybrid Unmanned Aerial/Underwater Vehicle at the air-water interface | 2986 |
| <i>Jason Crane, Imraan Faruque</i> | |

WIND ENERGY TECHNOLOGY

| | |
|---|------|
| CFD Analysis of the Effect of Atmospheric Boundary Layer on Wind Turbine Wake | 2994 |
| <i>Keita Kimura, Yasutada Tanabe, Takashi Aoyama, Chuichi Arakawa, Yuichi Matsuo, Makoto Iida</i> | |
| Gear Repair for Helicopters and Wind Turbines via Isotropic Superfinishing | 3001 |
| <i>Vincent Cline, Lane Winkelmann, Justin Michaud</i> | |
| Aeroelastic Optimization of Composite Wind Turbine Blades using Variable Stiffness Laminates | 3023 |
| <i>Etana Ferede, Mostafa Abdalla, Farhan Gandhi, Gerard van Bussel, Johannes Dillinger</i> | |
| Author Index | |