Acoustics

Acoustics I
Technical Session A: Tues. October 6, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Medium-Sized Helicopter Noise Abatement Flight Test

8:30 AM - 9:00 AM
Development and Validation of Generic Maneuvering Flight Noise Abatement Guidance for Helicopters

9:00 AM - 9:30 AM
A Perceptual Evaluation of the Efficacy of Sound Exposure Level in the Rating of Annoyance to Helicopter Noise
Matthew Boucher, Andrew Christian, Siddhartha Krishnamurthy, Stephen Rizzi, NASA Langley Research Ctr.;

10:00 AM - 10:30 AM
Experimental Acoustic Characterization of Anti-Phase Asymmetric Rotors
Raja Akif Raja Zahirudin, Jose Palacios, Sihong Yan, Pennsylvania State University; Nhan Nguyen, NASA Ames Research Center; Juntao Xiong, Stinger Ghaffarian Technologies Inc;

10:30 AM - 11:00 AM
Experimental and Computational Investigation of Stacked Rotor Acoustics in Hover
George Jacobellis, Rajneesh Singh, U.S. Army CCDC Army Research Laboratory; Rob McDonald, Uber; Chloe Johnson, University of Texas at Austin;

11:00 AM - 11:30 AM
Aeroacoustic Analysis of a Side-by-Side Hybrid VTOL Aircraft
Zhongqi Jia, Seongkyu Lee, University of California, Davis;

Acoustics II
Technical Session D: Thurs. October 8, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Coaxial Rotor Broadband Noise Prediction in Hover
Seongkyu Lee, Inbal Shlesinger, University of California, Davis;

8:30 AM - 9:00 AM
Rotor-on-Rotor Aeroacoustic Interactions of Multirotor in Hover
Eduardo Alvarez, Tyler Critchfield, Andrew Ning, Austin Schenk, Brigham Young University;

9:00 AM - 9:30 AM
Computational Prediction of Broadband Noise from a Representative Small Unmanned Aerial System Rotor
Christopher Thurman, James Baeder, University of Maryland; Nikolas Zawodny, NASA Langley Research Ctr.;

10:00 AM - 10:30 AM
A Comparison of Multicopter Noise Characteristics with Increasing Number of Rotors
Brendan Smith, Farhan Gandhi, Robert Niemiec, Rensselaer Polytechnic Institute;

10:30 AM - 11:00 AM
Findings in Aero-Acoustic Simulations for Optimizations
Gunther Wilke, * German Aerospace Center (DLR);

11:00 AM - 11:30 AM
**CFD and Aeroacoustic Analysis of Wingtip-Mounted Propellers**
Dilhara Jayasundara,* James Baeder, Yong Su Jung, University of Maryland;

11:30 AM - 12:00 PM
**Computation and Extraction of Boundary Layer Parameters from Numerical Simulations for Use in Rotor Acoustics Models**
Miranda Costenoble,* James Baeder, University of Maryland; John Hrynuk, Rajneesh Singh, US Army;
Advanced Vertical Flight

Advanced Vertical Flight I
Technical Session A: Tues. October 6, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Numerical study of distributed variable geometry ducted fans for eVTOLs
Francis Marois,* Mathieu Picard, David Rancourt, University of Sherbrooke;

8:30 AM - 9:00 AM
Modeling of Proprotor / Wing / Flap Interaction for Advanced Vertical Lift Aircraft
Todd Quackenbush,* Continuum Dynamics, Inc.; Christine Solomon, Daniel Wachspress, Michael Yu, Continuum Dynamics Inc.;

9:00 AM - 9:30 AM
Comparing RotCFD Predictions of the Multirotor Test Bed with Experimental Results
Sarah Conley,* Kristen Kallstrom, Ethan Romander, Carl Russell, NASA Ames Research Center;

10:00 AM - 10:30 AM
Hunter Denton,* Moble Benedict, Texas A&M University; Hao Kang, US Army Research Lab; Vikram Hrishikeshavan, University of Maryland;

10:30 AM - 11:00 AM
Helicopter Rotor Morphing for Performance Improvement in Reverse Flow Conditions

Advanced Vertical Flight II
Technical Session C: Wed. October 7, 2020 - 1:00 PM to 5:00 PM

1:00 PM - 1:30 PM
Design, Flight Dynamics and Control of Robotic Boomerang
Prashant Singh, Abhishek Abhishek,* Mangal Kothari, Indian Institute of Technology Kanpur;

1:30 PM - 2:00 PM
Aerodynamic Investigation of Non-Planar Wing Configurations for Quadrotor Based Tail-Sitters
Derek Safieh,* Inderjit Chopra, Vikram Hrishikeshavan, University of Maryland;

2:00 PM - 2:30 PM
Post-Failure Control Reconfiguration on a High-Speed Lift-Offset Coaxial Helicopter
Michael McKay,* Farhan Gandhi, Praneet Vayalali, Rensselaer Polytechnic Institute;

3:00 PM - 3:30 PM
Handling Qualities Assessment of Large Variable-RPM Multi-Rotor Aircraft for Urban Air Mobility
Matthew Bahr,* Farhan Gandhi, Michael McKay, Robert Niemiec, Rensselaer Polytechnic Institute;

3:30 PM - 4:00 PM
Lichten Award Paper: Experimental Measurements and Low-Order Modeling of Stacked Rotor Performance in Hover
Chloe Johnson,* University of Texas at Austin; Jayant Sirohi, The University of Texas at Austin;
Aerodynamics

Aerodynamics I
Technical Session A: Tues. October 6, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
An Overview of Wake Breakdown in High-Fidelity Simulations of Rotor-in-Hover
Nathan Hariharan,* Jennifer Abras, HPCMP CREATE; Robert Narducci, The Boeing Co.;

8:30 AM - 9:00 AM
Numerical Investigation of Secondary Vortex Structures in a Rotor Wake
Andrew Bodling,* Science and Technology Corporation; Mark Potsdam, U.S. Army Combat Capabilities Development Command;

9:00 AM - 9:30 AM
Rotating Wing Dynamic Stall: State of the Art and Future Directions
Marilyn Smith,* Georgia Institute of Technology; Anthony Gardner, German Aerospace Center; Francois Richez, ONERA; Rohit Jain, US Amy CCDC AvMC; David Peters, Washington University;

10:00 AM - 10:30 AM
Validation and Analysis of Aeroelastic Simulations of the UH-60A Rotor from Pre- to Post-stall Flight Conditions
François Richez,* ONERA The French Aerospace Lab; Amanda Grubb, Marilyn Smith, Georgia Institute of Technology; Camille Castells, ONERA. French Aerospace Lab; Rohit Jain, U.S. Army Aviation Development Directorate;

10:30 AM - 11:00 AM
High Fidelity Code-to-Code Comparison of Rotor Performance in Hover and Forward Flight
Joon Lim,* Rohit Jain, Mark Potsdam, US Army; Ronny Widjaja, AU DST Group; George Barakos, Thomas Fitzgibbon, University of Glasgow;

11:00 AM - 11:30 AM
Camille Castells,* Michel Costes, François Richez, ONERA;

11:30 AM - 12:00 PM
Simulation of Step Input in Collective Pitch for Hovering Rotor
Mark Woodgate,* George Barakos, Thomas Fitzgibbon, University of Glasgow; Pan Li, Nanjing University of Aeronautics and Astronautics; Yongjie Shi, Nanjing University of Aeronautics and Astronautics;

Aerodynamics II
Technical Session B: Wed. October 7, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Investigation of the Interactional Aerodynamics of the XV-15 Tiltrotor Aircraft
Steven Tran,* STC; Joon Lim, CCDC AvMC;

8:30 AM - 9:00 AM
Comparison of Computational and Experimental Hub Drag Breakdown for A Scaled-Coaxial Counter-Rotating Hub
Phurwat Anusanoti-Inthra,* Army Research Laboratory; Matthew Floros, US Army Research Lab;

9:00 AM - 9:30 AM
Aerodynamic Interactions on Airbus Helicopters’ Compound Helicopter RACER in Hover
Felix Frey,* Manuel Keßler, Ewald Krüger, Jakob Thiemeier, Constantin Hrle, Institute of Aerodynamics and Gas Dynamics, University of Stuttgart;

10:00 AM - 10:30 AM
A Computational Investigation of Multi-Rotor Interactional Aerodynamics with Hub Lateral and Longitudinal Canting
Richard Healy,* Farhan Gandhi, Rensselaer Polytechnic Institute; Michael Duffy, Mihir Mistry, The Boeing Co.;

10:30 AM - 11:00 AM
Towards Full-Scale Fuselage Drag Reduction Computations using Fluidic Oscillators
Nicholson Koukpaizan,* Ari Glezer, Marilyn Smith, Georgia Institute of Technology;

Aerodynamics III
Technical Session C: Wed. October 7, 2020 - 1:00 PM to 5:00 PM

1:00 PM - 1:30 PM
Investigations of Ship Airwakes Using Concurrent Computations and Experiments
David Farish,* Sven Schmitz, Regis Thedin, Pennsylvania State University; Dhuree Seth, Embry-Riddle Aeronautical University;

1:30 PM - 2:00 PM
Single Rotor Inflow and Wake Characterization in Hover with Dynamic Pitch Excitation
Patrick Mortimer,* Jayant Sirohi, University of Texas at Austin; Stephan Platzer, Juergen Rauleder, Institute of Helicopter Technology Technical University of Munich;

2:00 PM - 2:30 PM
Numerical Investigation of Unsteady Boundary Layer Transition on a Dynamically Pitching Rotor
Jared Carnes,* James Coder, University of Tennessee;

3:00 PM - 3:30 PM
Numerical and Experimental Investigation into the Aerodynamic Benefits of Rotorcraft Formation Flight
Mark Voskuilj,* Jan De Vries, Finbar Van Der Veen, Netherlands Defence Academy; Ramon Duivenvoorden, Delft University of Technology; Lars Moree, Royal Netherlands Air Force;

3:30 PM - 4:00 PM
Reduced-Order Modeling and Analysis of Unsteady Rotor Hub Flows
Tristan Wall,* James Coder, University of Tennessee in Knoxville;
Aircraft Design

Aircraft Design I
Technical Session B: Wed. October 7, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
More / All Electric Vertical Take-Off and Landing (VTOL) Vehicle Sensitivities to Propulsion and Power Performance
Christopher Snyder,* NASA John H. Glenn Research Center;

8:30 AM - 9:00 AM
VTOL Aerodynamic Configurations Analysis for Urban Air Mobility
Maxim Myasnikov,* Sergey Esaulov, Igor Ilyin, Mil Moscow Helicopter Plant;

9:00 AM - 9:30 AM
Evaluation of Sizing Strategies for eVTOL UAV Configurations
Ananth Sridharan,* Airbus A3; Bharath Govindarajan, Indian Institute of Technology Madras;

10:00 AM - 10:30 AM
Multirotor Configuration Trades Informed by Handling Qualities for Urban Air Mobility Application
Shannah Withrow,* Carlos Malpica, Keiko Nagami, NASA Ames Research Center;

10:30 AM - 11:00 AM
Demonstration of Prop-Rotor System Development for 52kg MTOW Quad-Tilt Prop UAV
Deog-Kwan Kim,* Seong-Wook Choi, Danbi Hong, Hee Jung Kang, Youngjun Kee, Taijoo Kim, Myeong-Gyu Lee, Seong-Yong Wie, Chul Yong Yun, Korea Aerospace Research Institute;

11:00 AM - 11:30 AM
Optimal Design of Rotor Blade for a Winged Compound Helicopter at High Advance Ratio
Masahiko Sugiura,* Hideaki Sugawara, Yasutada Tanabe, Japan Aerospace Exploration Agency; Takekawa Kuniyuki, Ryoyu Systems Co., Ltd.;

Aircraft Design II
Technical Session C: Wed. October 7, 2020 - 1:00 PM to 5:00 PM

1:00 PM - 1:30 PM
Mission Oriented Multi-Prop UAV Analysis using Statistical Design Trends
Omri Rand,* Vladimir Khromov, Technion - IIT;

1:30 PM - 2:00 PM
Conceptual Design of UAS Configurations with Dissimilar Rotors
Nathan Beals,* U.S. Army Research Laboratory; Bharath Govindarajan, Indian Institute of Technology Madras; Rajneesh Singh, U S Army Research Laboratory;

2:00 PM - 2:30 PM
Progress Toward a New Conceptual Assessment Tool for Aircraft Cost
Robert Scott,* J. Michael Vegh, US Army;

3:00 PM - 3:30 PM
Active and Passive Camber Morphing for Helicopter Rotors towards Performance Improvements in Hover and Vertical Flight
Kushagra Vidyarthi,* Roeland De Breuker, Marilena Pavel, Yasir Zahoob, Delft University of Technology; Mark Voskuijl, Netherlands Defence Academy;

3:30 PM - 4:00 PM
Helicopter Short Line Underslung Payload Transportation: Exploration of Magneto-Rheological Actuators for payload motion control
4:00 PM - 4:30 PM
The Innovative Blade Attachment for the new H145 Bearingless Main Rotor
Stefan Emmerling,* Gerald Kuntze-Fechner,* Max Wedekind, Airbus Helicopters;

4:30 PM - 5:00 PM
Bell 505 JRX, 250 Aircraft Delivered and Counting!
Patrick Paquin,* Yann Lavallee,* Bell;

Aircraft Design III
Technical Session E: Thurs. October 8, 2020 - 1:00 PM to 5:00 PM

1:00 PM - 1:30 PM
Investigation of BERP-Shape Tip Design on an Apache Rotor Blade
Ronny Widjaja, Defence Science and Technology; Rohit Jain, Joon Lim,* Mark Potsdam, US Army Combat Capability Development Command;

1:30 PM - 2:00 PM
University of Maryland's "Caladrius" - Graduate Winner 36th Student Design Competition
Seyhan Gul,* Abhishek Shastry, University of Maryland;

2:00 PM - 2:30 PM
University of Maryland/Universidad de Carlos "Tahr" - Undergraduate Winner 36th Student Design Competition
Benjamin Dobson, John Lewis,* University of Maryland;
Avionics and Systems

Technical Session E: Thurs. October 8, 2020 - 1:00 PM to 5:00 PM

1:00 PM - 1:30 PM
Cheseman Award Paper: Integration and Test of a Degraded Visual Environment System on H145
Tim Waanders,* Airbus Helicopters;

1:30 PM - 2:00 PM
A Systems Design Approach to Fuel Measurement for Hybrid-Electric Aircraft
Mark Connors,* Liquid Measurement Systems;

2:00 PM - 2:30 PM
It is Time for Army Aviation to Move to a Development Assurance Approach for Including Open Integrated Modular Avionics
Daniel Schrage,* Georgia Institute of Technology; William Lewis, Tennessee Technical Test Team;

3:00 PM - 3:30 PM
Stability Augmentation System for Coaxial Ultralight Helicopters
Tobias Richter,* Walter Fichter, Benjamin Rothaupt, Alexander Steinwandel, University of Stuttgart; Benedikt Grebing, edm aerotec GmbH;

3:30 PM - 4:00 PM
Using Deep Learning based Computer Vision in Helicopter Cockpits for Cognitive Decision Aiding
Vinay Huddar,* Nitesh Teja Mudapaka,* Collins Aerospace;

4:00 PM - 4:30 PM
Future Vertical Lift Digital Backbone, Navigating Technology and Implementation Details
Harold Tiedeman, Branden Sletteland,* Max Taylor, Collins Aerospace;

4:30 PM - 5:00 PM
Architecture And Application Of Hypervisor In FACE Environment With Safety Assurance
Jason Myren, Mitch Groen,* Collins Avionics;
Crash Safety

Crash Safety
Technical Session C: Wed. October 7, 2020 - 1:00 PM to 5:00 PM

1:00 PM - 1:30 PM
Crashworthiness of a Lift plus Cruise eVTOL Vehicle Design within Dynamic Loading Environments
Jacob Putnam,* Justin Littell, NASA Langley Research Ctr.;

1:30 PM - 2:00 PM
Development And Validation Of A SPH Bird Model In Abaqus/Explicit. Application To The Design Of The AW609 Tiltrotor Structure
Fabrizio Turconi, Riccardo Bay,* Maurizio Tirelli, Leonardo Helicopters; Ryan Miller, Jim Waterman, Agusta Westland Philadelphia Corporation; Marco Anghileri, Politecnico di Milano;
Crew Stations and Human Factors

**Crew Stations I**
**Technical Session D: Thurs. October 8, 2020 - 8:00 AM to 12:00 PM**

**8:00 AM - 8:30 AM**
*Flight Simulation Assessment of Autorotation Algorithms and Cues*
Mushfiqul Alam,* Michael Jump, University of Liverpool; Brian Eberle, Jonathan Rogers, Georgia Institute of Technology;

**8:30 AM - 9:00 AM**
*3D Conformal Pilot Cueing for Rotorcraft Shipboard Landings: A Comparison of Tunnel in the Sky and a Pursuit Guidance Flight Lead Cueing System*
Robert Walters,* Karen Feigh, Joe McCandless, Georgia Institute of Technology;

**9:00 AM - 9:30 AM**
*Using Augmented Reality to Reduce Workload in Offshore Environments*
Malte-Rn Maibach,* Michael Jones, Christian Walko, German Aerospace Center (DLR);

**10:00 AM - 10:30 AM**
*Virtual Cockpit Instruments and Visual Conformal Symbology on Head-Worn Displays for Helicopter Offshore Landings*
Lars Ebrecht,* Johannes Ernst, Sven Schmerwitz, German Aerospace Center (DLR);

**10:30 AM - 11:00 AM**
*An Evaluation of Pilot Electroencephalographic Activity during a Helicopter Tracking Task*
Andrew Law,* Kris Ellis, Sujoy Ghosh Hajra, Sion Jennings, National Research Council Canada;

**11:00 AM - 11:30 AM**
*Pupillometric Workload Measurement in the 360 Degree Integrated Cueing Environment (ICE)*
Amanda Hayes, Christopher Aura,* Kathryn Feltman, US Army Aeromedical Research Laboratory;

**11:30 AM - 12:00 PM**
*Identifying Operator Workload State through Psychophysiological Metrics in Rotary-wing Simulated Flight*
Kathryn Feltman,* Kyle Bernhardt, Amanda Kelley, U.S. Army Aeromedical Research Laboratory;

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**Crew Stations II**
**Technical Session E: Thurs. October 8, 2020 - 1:00 PM to 5:00 PM**

**1:00 PM - 1:30 PM**
*The Art of Helicopter EICAS Design*
Erik Oltheten,* Bell;

**1:30 PM - 2:00 PM**
*Influence of Optical and Gravito-Inertial Cues to Height Perception During Supervisory Control*
Martine Godfroy-Cooper,* Edward Bachelder, Joel Miller, SJSU/US ARMY/ADD/AvMC/Aviation; Francois Denquin, Jean-Christophe Sarrazin, ICNA/DTIS/ONERA;

**2:00 PM - 2:30 PM**
*Multisensory Cues for Addressing Spatial Orientation*
Bruce Mortimer,* Engineering Acoustics Inc.; Angus Rupert,* USAARL;

**3:00 PM - 3:30 PM**
*Assessment of a Multimodal Cueing Set for Maintaining Aviators' Situational Awareness in a Degraded Visual Environment*
Kathryn Feltman,* Aaron McAtee, U.S. Army Aeromedical Research Laboratory; Gina Hartnett, Army Combat Capabilities Development Command; Martine Godfroy-Cooper, Joel Miller, San Jose State Research Foundation;
3:30 PM - 4:00 PM
Multisensory Cueing to Resolve Helicopter Drift Detection in DVE
Angus Rupert,* DRIP; Chris Brill, Air Force Research Lab; Braden McGrath, Embry-Riddle Aeronautical University; Bruce Mortimer, Engineering Acoustics Inc.;
Dynamics

Dynamics I
Technical Session A: Tues. October 6, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
From Helicopter Vibrations to Passenger Perceptions: A Closer Look on Standards
S•Leyman •Zkurt,* Walter Fichter, Tobias Rath, University of Stuttgart; Oliver Dieterich, Martijn Priems, Airbus Helicopters; Heinrich B•Lthoff, Suzanne Nooij, Max Planck Society;

8:30 AM - 9:00 AM
Validation of Enhanced Rotorcraft Aeromechanics Simulations: Flow Field, Unsteady Loads and Vibrations
Ramin Modarres,* Peter Lorber,* Byung Young Min, Jinggen Zhao, Sikorsky, a Lockheed Martin Co.;

9:00 AM - 9:30 AM
Lichten Runner-up: A Scalable Time-Parallel Solution of Periodic Rotor Dynamics in X3D
Mrinalgouda Patil,* Anubhav Datta, University of Maryland;

10:00 AM - 10:30 AM
Sensitivity Study of Helicopter Vibrations and Loads with Elastic Fuselage Coupling and Dynamic Empennage Loads from Free Wake Analysis
Willem Rex, Manfred Hajek, Markus Rinker,* Technical University of Munich;

10:30 AM - 11:00 AM
Comparisons of Fully Coupled Aeroelastic Fuselage Simulations to UH-60A Airloads Program Data
Nicolas Reveles,* Eric Blades, Tyler Pierce, ATA Engineering; Hyeonsoo Yeo, US Army Combat Capabilities Development Command Aviation & Missile Center;

11:00 AM - 11:30 AM
Tiltrotor Conversion Maneuver Analysis with RCAS
Hyeonsoo Yeo,* U.S. Army Technology Development Directorate; Hossein Saberi, Advanced Rotorcraft Technology;

Dynamics II
Technical Session B: Wed. October 7, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Aeromechanical Behavior and Aeroelastic Stability of Coaxial Rotors in Hover and Forward Flight
Puneet Singh,* Peretz Friedmann, University of Michigan;

8:30 AM - 9:00 AM
Pretest Flutter Predictions of the Upcoming Aeroelastic Tiltrotor Wind Tunnel Test
Andrew Kreshock,* Hao Kang, Robert Thornburgh, Hyeonsoo Yeo, U. S. Army Combat Capabilities Command; Jennifer Baggett, Jinwei Shen, University of Alabama;

9:00 AM - 9:30 AM
Scalable Mesh Partitioning for Large-Scale 3D Finite Element-Multibody Structures
Ravi Lumba,* Anubhav Datta, University of Maryland;

10:00 AM - 10:30 AM
An Evaluation of Finite-State Dynamic Inflow for Usage in Design
Jimmy Ho,* Science and Technology Corporation; Hyeonsoo Yeo, U.S. Army Combat Capabilities Development Command Aviation & Missile Center;

10:30 AM - 11:00 AM
Wind Tunnel Test on a slowed Mach-Scaled Hingeless Rotor with Lift Compounding
11:00 AM - 11:30 AM
Modal Elastic Component Enhancements for RCAS
Matthew Hasbun,* Ryan Blumenstein, Hossein Saberi, Advanced Rotorcraft Technology;

11:30 AM - 12:00 PM
Relative Rotor Phasing for Multicopter Vibratory Load Minimization
Robert Niemiec,* Farhan Gandhi, Nicholas Kopyt, Rensselaer Polytechnic Institute;
Electric Vertical Takeoff and Landing (eVTOL)

eVTOL I
Technical Session B: Wed. October 7, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Investigation of Near Ground Effects in Hover Flight for the Multi-Rotor Aircraft Volocopter-2X
Sebastian Miesner,* Manuel Ke, Ler, Ewald Mer, IAG, University of Stuttgart; Ulrich Sch, Ferlein, Volocopter GmbH;

8:30 AM - 9:00 AM
Wind Tunnel Testing and Analysis of a Rigid, Variable Speed Rotor for eVTOL Applications
William Staruk,*, Evan Bonny, Lauren Butt, Cody Gray, Garrett Hennig, Diego Represa, Richard Toner, Aurora Flight Sciences, Inc.;

9:00 AM - 9:30 AM
Use of a High Energy-Dense Li Anode Cell for an eVTOL Application
Robert Hess,*, Joshua Stewart, BAE Systems; Jeff Britt, Mark Niedzwiecki, Sion Power;

10:00 AM - 10:30 AM
Simulation and Characterization of Variable-Voltage Hybrid-Electric Powertrains
Brent Mills,* Anubhav Datta, University of Maryland;

10:30 AM - 11:00 AM
Electric Propulsion Component Sizing for Optimal Aircraft Configuration
Michael Ricci,* Jack Myers, Brad Paden, Ryan Rahn, LaunchPoint Electric Propulsion Solutions;

eVTOL II
Technical Session C: Wed. October 7, 2020 - 1:00 PM to 5:00 PM

1:00 PM - 1:30 PM
Developing Sustainable Urban Air Mobility Infrastructure that is Efficient, Safe and Regulatory Compliant
Rex Alexander,* Five-Alpha LLC; Jonathan Daniels, Praxis Aerospace Concepts International, Inc.;

1:30 PM - 2:00 PM
Working Group on eVTOL Noise Assessment
David Josephson,* Josephson Engineering, Inc.;

2:00 PM - 2:30 PM
The Integral Approach to Define the Ecosystem for the Aerial Taxi Service in Dubai
Denis Heckmann,* Maximilian Fischer, Alexander Nase, FEV Consulting; Ruba Fawzy Abdelal, Khaled Al Awadhi, Amair Saleem, Roads and Transport Authority Dubai;

3:00 PM - 3:30 PM
The Influence of the Wiring Harness on the System Performance of eVTOL Aircraft on the Example of Common Reference Models
Sebastian Oberschwendtner,* Technical University Munich;

3:30 PM - 4:00 PM
A Life-Cycle Economic Study of eVTOL Air Taxi Service in the U.S. North-East Region
Nate Sirirojvisuth,* PRICE Systems LLC; Cedric Y. Justin, Georgia Institute of Technology; Simon Briceno, Jaunt Air Mobility LLC;
Handling Qualities

Handling Qualities I
Technical Session B: Wed. October 7, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Flight Mechanics of the RACER Compound H/C
Remy Huot,* Paul Eglin,* Airbus Helicopters;

8:30 AM - 9:00 AM
Exploring Pilot Workload Using Inceptor Time Histories
Ryan Paul,* Matthew Rhinehart, NAWCAD;

9:00 AM - 9:30 AM
Estimating Handling Qualities Ratings from Slalom Flight Data: A Psychophysical Perspective
Edward Bachelder,* Martine Godfroy-Cooper, San Jose State University Research Foundation; Bimal Aponso, NASA Ames Research Center; Jeffrey Lusardi, U.S. Army Aviation Development Directorate;

10:00 AM - 10:30 AM
Identifying Pilot-Induced Oscillation Tendencies in Advanced Fly-by-Wire Rotorcraft

10:30 AM - 11:00 AM
Development and Flight Validation of Proposed Unmanned Aerial System Handling Qualities Requirements
Christina Ivler,* Declan Kerwin, Joel Otomize, Danielle Parmer, Kevin Truong, University of Portland; Norma Gowans, SJSURF; Mark B. Tischler, U.S. Army Combat Capabilities Development Command Aviation & Missile Center;

11:00 AM - 11:30 AM
Explicit Uncertainty Quantification for Probabilistic Handling Qualities Assessment
Umberto Saetti,* Jonathan Rogers, Georgia Institute of Technology;

11:30 AM - 12:00 PM
Development and Assessment of Flight Lead Cue for Real-time Guidance and Pilot Workload Reduction in Rotorcraft
Shipboard Recovery
Vinodhini Comandur,* Karen M. Feigh, J. V. R. Prasad, Robert Walters, Georgia Institute of Technology;

Handling Qualities II
Technical Session C: Wed. October 7, 2020 - 1:00 PM to 5:00 PM

1:00 PM - 1:30 PM
US-German Joint In-flight and Simulator Evaluation of Collective Tactile Cueing for Torque Limit Avoidance – Shaker vs. Soft Stop
Mario M€llner,* DLR; Jeff Lusardi, CCDC AvMc Aviation Development Directorate;

1:30 PM - 2:00 PM
Bell V-280 System Identification and Model Validation with Flight Test Data using the Joint Input-Output Method
Caitlin Berrigan,* Paul Ruckel, Bell; Mark Lopez,* CCDC AvMc Aviation Development Directorate; J.V.R. Prasad, Georgia Institute of Technology;

2:00 PM - 2:30 PM
Design and Evaluation of Control Laws for the CH-53E Low Speed Precision Control System
Matthew Rhinehart,* Robert Brymer, Eric O'Neill, U.S. Navy;

3:00 PM - 3:30 PM
CH-53K Control Laws: Improved Safety and Performance in the Degraded Visual Environment
David Engel, NAVAIR; Alex Faynberg, Steven Spoldi, Sikorsky, a Lockheed Martin Co.;

3:30 PM - 4:00 PM
Design and Analysis of a Blended Command Model for Low Speed Flight
Geoffrey Jeram, U.S. Army; Ondrej Juhasz, U.S. Naval Academy;

4:00 PM - 4:30 PM
Outer-Loop Control Design and Simulation Handling Qualities Assessment for a Coaxial-Compound Helicopter and Tiltrotor
Tom Berger, Mark Tischler, US Army Aviation Development Directorate; Joseph Horn, The Pennsylvania State University;

4:30 PM - 5:00 PM
Compound Rotorcraft Yaw Control Fault Detection
Jeffrey Lewis, Pennsylvania State University; Venkatakrishnan Iyer, Eric Johnson, Pennsylvania State University;

Handling Qualities III
Technical Session E: Thurs. October 8, 2020 - 1:00 PM to 5:00 PM

1:00 PM - 1:30 PM
Real-Time Nonlinear Model Predictive Control of a Helicopter in Autorotation
Brian Eberle, Jonathan Rogers, Georgia Institute of Technology;

1:30 PM - 2:00 PM
System Identification and Handling Qualities Predictions of an eVTOL Urban Air Mobility Aircraft Using Modern Flight Control Methods
Robert Niemiec, Farhan Gandhi, Rensselaer Polytechnic Institute; Mark Lopez, Mark Tischler, U.S. Army Combat Capabilities Development Command Aviation and Missile Center;

2:00 PM - 2:30 PM
Flight Dynamics and Control of an eVTOL Concept Aircraft with a Propeller-Driven Rotor
Umberto Saetti, Georgia Institute of Technology; Jacob Enciu, Joseph F. Horn, Pennsylvania State University;

3:00 PM - 3:30 PM
Nonlinear Dynamic Inversion Control for Urban Air Mobility Aircraft with Distributed Electric Propulsion
Jean-Pierre Theron, Jacob Enciu, Joseph Horn, Pennsylvania State University; Daniel Wachspress, Continuum Dynamics, Inc.;

3:30 PM - 4:00 PM
Hover Handling Qualities of Fixed-Pitch, Variable-RPM Quadcopters with Increasing Rotor Diameter
Ariel Walter, Farhan Gandhi, Michael McKay, Robert Niemiec, Rensselaer Polytechnic Institute; Christina Ivler, University of Portland;

4:00 PM - 4:30 PM
Trade-off between Maneuver Performance and Component Load Limiting
Chams Eddine Mbollo, J.V.R. Prasad, Georgia Institute of Technology;
Health and Usage Monitoring Systems (HUMS) - Condition Based Maintenance (CBM)

HUMS I
Technical Session D: Thurs. October 8, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Signal Processing to Reduce the Effect of Gear Dynamics
Eric Bechhoefer,* GPMS Inc; Yalin Ozturk, Turkish Aerospace;

8:30 AM - 9:00 AM
Bell 525 Relentless Using Tail Rotor Torque Measurements for Maintenance Credit
Brian Tucker,* Ankit Patel, Drew Waller, Bell;

9:00 AM - 9:30 AM
Rotorcraft Lubrication Optimization through Grease Sampling and Analysis
Richard Wurzbach,* MRG Labs; Mike Johnson, AMRRI; Tim Singer, Boeing Co.;

10:00 AM - 10:30 AM
Rotor Fault Detection and Identification on a Hexacopter under Varying Flight States Based on Global Stochastic Models
Aerin Dutta,* Farhan Gandhi, Fotis Kopsaftopoulos, Michael McKay, Rensselaer Polytechnic Institute;

10:30 AM - 11:00 AM
A Motion Primitive Perspective on Rotorcraft Regime Recognition
Umberto Saetti,* Jonathan Rogers, Georgia Institute of Technology;

11:30 AM - 12:00 PM
Event-Based Regime Recognition Accuracy
Jason Hull,* Jeffrey Monaco, Spire Innovations, LLC; Mark Glucksman-Glaser, Roberto Semidey, Naval Air Systems Command;

HUMS II
Technical Session D: Thurs. October 8, 2020 - 1:00 PM to 5:00 PM

1:00 PM - 1:30 PM
Modeling a Maintenance Free Operating Period Strategy for Future Vertical Lift
Andrew Bellochio,* Matthew Beigh,* United States Military Academy; James Burgess, CCDC AvMC ADD; Daniel Schrage, Georgia Institute of Technology;

1:30 PM - 2:00 PM
Health-Aware Digital Enterprise A Blueprint for Digital Thread Integration for Future Vertical Lift Sustainment
Mark Thomson,* Logan Caraway, Brian Tucker, Bell;

2:00 PM - 2:30 PM
Automated Component Tracking Technologies for Future Vertical Lift
Raj Bharadwaj,* Honeywell; Hayley Borck, Honeywell Aerospace; John Moffatt, US Army, AvMC ADD-E;

3:00 PM - 3:30 PM
Monitoring Gross Weight and Center of Gravity Position: A Review of the Challenges and Current Estimation Approaches
Catherine Cheung,* Davis To, National Research Council;

3:30 PM - 4:00 PM
Towards Unified Probabilistic Rotorcraft Damage Detection and Quantification via Non-parametric Time Series and Gaussian Process Models
History

Technical Session D: Thurs. October 8, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
The Aircraft, the Rotorcraft and the Life of Walter Rieseler 1890-1937
Berend G. Van Der Wall,* German Aerospace Center (DLR);

8:30 AM - 9:00 AM
The Life and Mysterious Death of Harold F. Pitcairn: Was it Suicide?
Bruce Charnov,* Hofstra University;

9:00 AM - 9:30 AM
A Design Worthy of Success: Bernard Sznyeier, Selma Gottlieb and the Intercity SG-VI
Renald Fortier,* Canada Aviation and Space Museum;

10:30 AM - 11:00 AM
Perseverance: Some Reflections on 55 Years of the Canadian Sea King
John Orr,* Independent Researcher;

11:00 AM - 11:30 AM
Applicable Lessons Learned from AHIP/OH-58D and LHX/RAH-66 Development Programs for the Army's FARA Open Systems Aircraft
Daniel Schrage,* Georgia Institute of Technology; William Lewis, Tennessee Technical Test Team;

11:30 AM - 12:00 PM
Attack Helicopter Generations
Michael Leong,* The Boeing Co.;
Manufacturing Technology and Processing

Manufacturing and Technology
Technical Session D: Thurs. October 8, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Bell 505 Automation at Final Assembly - Project Octopus
Cédric Roche,* Sbastien Giroux, Bell;

8:30 AM - 9:00 AM
XV-15 Tilt Rotor Research Aircraft Photogrammetry and Metrology Measurement
Haley Cummings,* Belen Bowman, Shirley Burek, Michelle Dominguez, Christopher Silva, Eduardo Solis, NASA Ames Research Center;

9:00 AM - 9:30 AM
Utilizing Casting Technologies on Legacy Parts
Heather Woodworth,* Andrew Featheringham,* Sikorsky, a Lockheed Martin Co.;

10:30 AM - 11:00 AM
Reducing Risk in 3D Printed Composite Tooling
Eric Dunn,* Sikorsky, a Lockheed Martin Co.;

11:00 AM - 11:30 AM
Practical Solutions for Embedding Fiber Optics in Composites
Nathaniel Dew,* Sikorsky, a Lockheed Martin Co.;

11:30 AM - 12:00 PM
T55 Gas Turbine Engine Bleed Band Actuator Housing Re-Design
Wesley Cass,* U.S.Army;
Modeling and Simulation

Modeling and Simulation I
Technical Session A: Tues. October 6, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Comparison of Different Approaches for Modeling Vortex - Rotor Wake Interference on Rotor Trim
Berend G. Van Der Wall,* German Aerospace Center (DLR);

8:30 AM - 9:00 AM
Performance of Gradient Boosted Trees for Prediction of Coaxial Inflow Models with XGBoostTM
Cory Seidel, Ethan Genter,* David Peters, Washington University in St. Louis;

9:00 AM - 9:30 AM
Enhancement and Validation of VPM-Derived State-Space Inflow Models for Multi-Rotor Simulation
Chengjian He, Chongseok Chang, Matthew Gladfelter,* Advanced Rotorcraft Technology; Mark Lopez, Mark Tischler, US ARMY CCDC AvMC; Ondrej Juhasz, US Naval Academy;

10:00 AM - 10:30 AM
Linearized Inflow and Interference Models from High Fidelity Free Wake Analysis for Modern Rotorcraft Configurations
Jeffrey Keller,* Robert McKillip, Daniel Wachspress, Continuum Dynamics, Inc.; Mark Lopez, Mark Tischler, Aviation Development Directorate, CCDC, AvMC; Ondrej Juhasz, US Naval Academy;

10:30 AM - 11:00 AM
Inflow Based Flight Dynamics Modeling Improvements for the Sikorsky X2 TechnologyTM Demonstrator
Ondrej Juhasz,* US Naval Academy; Hong Xin,* Sikorsky, a Lockheed Martin Co.; Mark Tischler, US Army CCDC AvMC;

11:00 AM - 11:30 AM
Understanding the Effect of Rotor-to-Rotor Interference on CH-47D Helicopter Dynamics
Feyyaz Guner,* J. V. R. Prasad, Georgia Institute of Technology; David G. Miller, The Boeing Co.;

11:30 AM - 12:00 PM
Bell 412 Modeling and Model Fidelity Assessment for Level-D Training Simulators
Vincent Myrand-Lapierre,* Michel Nadeau-Beaulieu, CAE; Mark B. Tischler, ADD, CCDC Aviation & Missile Center; Marilena D. Pavel, Olaf Stroosma, Delft University of Technology; Bill Gubbels, NRC, Flight Research Laboratory; Mark White, The University of Liverpool;

Modeling and Simulation II
Technical Session B: Wed. October 7, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Performance of Recent Large-angle Extensions to Classical Simulator Washout Algorithms
Robert Langlois, John Hayes, Rishad Irani, Mikayla Micomonaco,* Carleton University;

8:30 AM - 9:00 AM
eVTOL Accretion Modeling for Supporting Algorithmic Icing Detection
Robert McKillip,* Andrew Kaufman, Todd Quackenbush, Continuum Dynamics Inc.;

9:00 AM - 9:30 AM
A Turbulence Model for Flight Simulation and Handling Qualities Analysis based on a Synthetic Eddy Method
Sergio Henriquez Huecas,* Mark White, University of Liverpool; George Barakos, University of Glasgow;

10:00 AM - 10:30 AM
Towards Validation of a Dynamic Interface Simulation using Flight Test Data
Tyler Christoffel,* Chris Hendrick, Joseph Horn, Sven Schmitz, Regis Thedin, Penn State University;
Redistributed Pseudoinverse Control Allocation for Actuator Failure on a Compound Helicopter
Praneet Vayalali,* Farhan Gandhi, Michael McKay, Rensselaer Polytechnic Institute;

Modeling and Simulation III
Technical Session E: Thurs. October 8, 2020 - 1:00 PM to 5:00 PM

1:00 PM - 1:30 PM
System Identification of a Coaxial Ultralight Helicopter
Tobias Richter, Walter Fichter, Benjamin Rothaupt,* University of Stuttgart; Benedikt Grebing, edm aerotec GmbH;

1:30 PM - 2:00 PM
Guidelines for System Identification of Vehicles with Highly Correlated Inputs
Tom Berger,* Mark Lopez, Mark Tischler, CCDC Aviation & Missile Center; Aaron Wagner, San Jose State University;

2:00 PM - 2:30 PM
Methodology Correlation for Coaxial Rotor and Blade Load Prediction
Jinggen Zhao,* Mikel Brigley, Ramin Modarres, Hong Xin, Sikorsky, A Lockheed Martin Company;

3:00 PM - 3:30 PM
Visual Augmentation for Personal Air Vehicles During Flight Control System Degradation
Tim Mehling,* Manfred Hajek, Omkar Halbe, Matthias Heller, TUM Technical University of Munich; Milan Vrdoljak, University of Zagreb;

3:30 PM - 4:00 PM
A Virtual Reality Approach to Piloted Flight Simulation
Matteo Daniele, Pierangelo Masarati,* Giuseppe Quaranta, Andrea Zanoni, Politecnico di Milano;

4:00 PM - 4:30 PM
UAV Dynamics and Electric Power System Modeling and Visualization using Modelica and FMI
Meaghan Podlaski,* Hao Chang, Hamed Nademi, Luigi Vanfretti, Rensselaer Polytechnic Institute;
Operations

Technical Session D: Thurs. October 8, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Dynamic Performance Investigation for Tilt-rotor Aircraft
Ye Yuan,* David Anderson, Douglas Thomson, University of Glasgow;

8:30 AM - 9:00 AM
Dragonfly: Defining Environments for Rotorcraft Flight on Titan
Ralph Lorenz,* Applied Physics Laboratory;

9:00 AM - 9:30 AM
A Concept of Operations for Advanced Manufacturing of Small Unmanned Aircraft Systems for Marine Squads
John Gerdes,* Nathan Beals,* Eric Holder, James Humann, CCDC ARL;

10:00 AM - 10:30 AM
Blockchain Applications for Rotorcraft Component Tracking
Taavi Taijala, Raj Bharadwaj,* Honeywell; John Moffatt, US Army, AvMC ADD-E;

10:30 AM - 11:00 AM
Preliminary Insights on Small eVTOL Design Trends from Surrogate Modeling for Operations Research
Product Support Systems Technology

Product Support
Technical Session E: Thurs. October 8, 2020 - 1:00 PM to 5:00 PM

1:00 PM - 1:30 PM
Leveraging Additive Manufacturing for Low-Volume, Out-of-Production Spare Parts
Thomas Reilly,* Bell;

1:30 PM - 2:00 PM
U.S. Army Rotary-wing Airframe Defect Trending, Modeling, and Analysis
Jared Peltier,* Prasant Chhotu, US Army Combat Capabilities Development Command Aviation & Missile Center;

2:00 PM - 2:30 PM
Additive Manufacturing Implementation in Rotorcraft Sustainment
William Harris,* Sikorsky, a Lockheed Martin Co.;

3:00 PM - 3:30 PM
Holistic Life Management of Damage Tolerant Airframes
Darryl Toni,* Avinash Sarlashkar, Sikorsky, a Lockheed Martin Co.;
Propulsion

Propulsion I
Technical Session A: Tues. October 6, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
An Empirical Inlet Pressure Recovery Model for Engine Inlet Barrier Filters for Rotorcraft Applications
Man Zhang,* Mark Beeman, US Army, CCDC, Aviation and Missile Center;

8:30 AM - 9:00 AM
Experimental Results of Transient Variable Speed Rotor Performance for Small UAS Propulsion Scalability
Kendy Edmonds, Virginia Polytechnic & State University; D Blake Stringer,* Kent State University; Mark Valco, NASA Glenn Research Center;

9:00 AM - 9:30 AM
A Prediction Model of Transient Variable Speed Rotor Performance for Small UAS Propulsion Scalability
D Blake Stringer,* Kent State University; Mark Valco, NASA Glenn Research Center; Kendy Edmonds, Virginia Polytechnic & State University;

10:00 AM - 10:30 AM
Recent Developments of the Arrayed Controlled Turn-less Structures (ACTS) Motor
Oved Zucker,* Carl Demolder, Thanh Le, Polarix Corp.;

10:30 AM - 11:00 AM
Comparison of Variator Technologies for Variable Rotor Speed Drivetrains for Rotorcraft
Hanns Amri,* Lorenz Braumann, ZOERKLER GEARS GmbH & Co KG; Florian Donner, Felix Huber, Michael Weigand, Vienna University of Technology;

11:00 AM - 11:30 AM
Development of a Brushless DC Motor Sizing Algorithm for a Small UAS Design Framework
Farid Saemi,* Moble Benedict, Texas A&M University; Nathan Beals, Army Research Laboratory;

11:30 AM - 12:00 PM
Embedded Sensing for Gas Turbine Engine Component Health Monitoring
Muthuvel Murugan,* Anindya Ghoshal, Michael Walock, US Army Combat Dev. Command-ARL; Roger Caesley, Robert Knapp, Epsilon Optics Ltd.;

Propulsion II
Technical Session B: Wed. October 7, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Computational Thermal Analysis and Testing to Improve Loss of Lubrication Performance of Helicopter Transmissions
Kenta Ogasawara,* Hidenori Arisawa, Hironori Hashimoto, Akira Hayasaka, Yuji Shinoda, Hiroki Yamamoto, Kawasaki Heavy Industries, Ltd.;

8:30 AM - 9:00 AM
Contact Pattern Development of the CH-53K MGB with Split-Path Gear-Train
Shulin He,* Yrivi Gmiyra, Chris Pierce, Sikorsky, a Lockheed Martin Co.; Leslie Leigh, NAVAIRSYSCOM HQ;

9:00 AM - 9:30 AM
Static Transmission Error Analysis of a Hybrid Spur Gear Drivetrain
Sean Gauntt,* Robert Campbell, Sean McIntyre, Pennsylvania State University;

10:00 AM - 10:30 AM
Modeling and Design of a Wet Clutch Offset Compound Gear Transmission for Dual-Speed Rotorcraft Applications
10:30 AM - 11:00 AM
Processing and Property Comparison of High-Temperature Carbon/BMI Composites
Matthew Waller,* Kevin Koudela, Sean McIntyre, Penn State;

11:00 AM - 11:30 AM
Low-Order Prediction of Mineral Dust Sticking Probability in Turboshaft Engines
Matthew Ellis,* Nicholas Bojdo, Antonio Filippone, Merren Jones, Alison Pawley, University of Manchester;

11:30 AM - 12:00 PM
Performance Deterioration of Rotorcraft Engines fitted with Particle Separators
Nicholas Bojdo,* Wesley Appleton, Matthew Ellis, Antonio Filippone, Jee-Loong Hee, University of Manchester;

12:00 PM - 12:30 PM
Green House Gas (GHG) Reduction Study for the Rotorcraft Industry
Albertus Tjandra,* Bell Textron; Vincent Routhieau, Airbus Helicopters; Wajid Chishty, NRC; Pierre-Marie Basset, ONERA; Robert Peluso, Pratt & Whitney Canada; Claude B-Ray, Safran Helicopter Engines;
Safety

Technical Session A: Tues. October 6, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Restoring Practical Single Engine IFR to the Marketplace
Erik Otheten,* Bell;

8:30 AM - 9:00 AM
Explainable AI: Rotorcraft Attitude Prediction
Hikmat Khan,* Nidhal Bouaynaya, Ghulam Rasool, Rowan University; Charles Johnson, Federal Aviation Administration;

9:00 AM - 9:30 AM
Status and Way Forward on Rotorcraft Lightning Protection
Bernard Tagliana, Marc Meyer, Sonia Zehar,* Airbus Helicopters;

10:00 AM - 10:30 AM
Artificial Intelligence for Helicopter Safety: Head-Pose Estimation in the Cockpit
Ghulam Rasool, Nidhal Bouaynaya, Éric Feuerstein,* Ramachandran Ravi, Rowan University; Charles C. Johnson, Federal Aviation Administration;

10:30 AM - 11:00 AM
Appropriate Calculation of Risk per Flight Hour for Rotorcraft Safety Risk Management
John Hewitt,* Loan (Joan) Pham,* Sikorsky, a Lockheed Martin Co.;

11:00 AM - 11:30 AM
A twenty-five-year Retrospective Analysis of Australia’s Previous Defence Aviation Safety Framework
James Hood, Arvind Sinha,* Australian Department of Defence; Pier Marzocca, RMIT University;
Structures and Materials

Technical Session C: Wed. October 7, 2020 - 1:00 PM to 5:00 PM

1:00 PM - 1:30 PM
Gear Rim Failure Prediction Based on Fracture Mechanics
Biqiang Xu,* Sikorsky, a Lockheed Martin Co.;

1:30 PM - 2:00 PM
Structural Integrity Challenges for Future Rotorcraft Programs
Robert Benton,* US Army;

2:00 PM - 2:30 PM
Determining TH-1H Tailboom Loads from Measured Strain Gage Data
Ken Taylor,* Margaret Gibson, Kathryn Mason, Mercer Engineering Research Center;

3:00 PM - 3:30 PM
Development of a Rotorcraft Structural Integrity Program Master Plan for Future Vertical Lift
Lisa Chiu,* Dennis McCarthy, The Boeing Co.; Matthias Krastel, Sikorsky, a Lockheed Martin Co.; Derrell Lorthridge, U.S. Army Combat Capabilities Development Command Aviation & Missile Center;

3:30 PM - 4:00 PM
Investigation of Fatigue and Flaw Tolerance Performance of 18CrNiMo7-6 Case-hardening Steel
Yal?N ◆Zt ◆Rk,* Ufuk Akcihan, Fazl? Fatih Melemez, Turkish Aerospace;

4:00 PM - 4:30 PM
Fatigue Life Improvement in Hierarchically Organized Nanocomposites for Application to Rotorcrafts
Mithil Kamble,* Nikhil Koratkar, Aniruddha S Lakhnot, Caitain Picu, Rensselaer Polytechnic Institute;

4:30 PM - 5:00 PM
Low AOB Component Loads Derivation to Implement MH-60R HUMS
Suresh Moon,* Technical Data Analysis, Inc.; Daniel Liebschutz, NAVAIR;
System Engineering Tools/Processes

Systems Engineering
Technical Session D: Thurs. October 8, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Engineering Challenges To Reinvent The Sky
RobertoLicata,* Dassault Systèmes;

8:30 AM - 9:00 AM
Integration of VTOL Air-taxis into an Existing Infrastructure with the Use of the Model-Based System Engineering (MBSE) Concept CUBE
Nicolas J.Ckel,* MalteGrotenrath, PhilippOrth, RobertSchaller, FEV Europe GmbH; MaximilianFischer, FEV Consulting GmbH; JakobAndert, ChristianGranrath, Institute forCombustion Engines;

9:00 AM - 9:30 AM
A Systems Engineering Approach for Enabling Research and Development in the Vertical Lift Autonomy Flight Sciences Domain
MarcAlexander,* DerekGowanlock, ArthurGubbels, National Research Council of Canada; MarkSpano, BoeingDefense; FernandoDones,* GlennRossi, BoeingPhantomWorks;

10:00 AM - 10:30 AM
ScottWigginton,* CCDCAvMC; PaulJonas, FirePoint; RonaldTowns, RWTConsulting; GordonHunt,* Skayl;

10:30 AM - 11:00 AM
Advances in Property Model Methodology (PMM)
PatriceMicouin, MicouinConsulting; LouisFabre,* ChristianGaurel, PascalPandolfi, PascalPaper, ThomasRazafimahefa, AirbusHelicopters;

10:30 AM - 11:00 AM
Advances in Property Model Methodology (PMM)
NicolasMartignago, Airbus Helicopters;

11:00 AM - 11:30 AM
Integration of Model-Based Systems Engineering and a Modular Open System Approach using DevSecOps with Agile Software Methods
ThomasDuBois,* ChristopherGoebel, RobertMatthews, L3Harris; JohnStough, JHNA, Inc.; DavidLinden, Leidos, Inc.; DavidWalsh, SigmaTech;
Test and Evaluation

Test and Evaluation I
Technical Session D: Thurs. October 8, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Experimental and Numerical Investigation of Interaction Between Rotor and Wing at High Advance Ratio
Yasutada Tanabe,* Noboru Kobiki, Hideaki Sugawara, Japan Aerospace Exploration Agency; Hirotaka Hayashi, Wataru Kobayashi, Ryosuke Satou, SUBARU Corporation;

8:30 AM - 9:00 AM
Digital Twin Approach for Structural Property Evaluation of Next Generation Active Twist Blades
Hyun Hwang, Jun Ahn, Sehoon Chang, Sung Jung,* Konkuk University; Steffen Kalow, Ralf Keimer, German Aerospace Center (DLR);

9:00 AM - 9:30 AM
Design of a Lean Avionics Rig for Efficient System Integration and Human Factors Testing
Nicolas Callejo Goena,* Pasquale Chiella,* Giovanni Di Meo,* Kopter Group AG;

10:00 AM - 10:30 AM
MH-60 Full Scale Test Rig Loads Development and Analysis
Robert McGinty,* Jeffery Brenna, MERC; John Vine, DST Group; Dan Liebschutz, NAVAIR; Philip Conjeiko, SAIC;

10:30 AM - 11:00 AM
Development & Testing of a Rotorcraft Engine Transmission Lubrication System
Todd Harder,* The Boeing Co.;

11:00 AM - 11:30 AM
Hardware-in-the-Loop Dynamic Wind Tunnel Investigation of Slung Loads Dynamics with Application to Active Cargo Hook Stabilization of an M119 Howitzer
Aviv Rosen, Tel Aviv University; Joseph Horn,* Pennsylvania State University;

Test and Evaluation II
Technical Session E: Thurs. October 8, 2020 - 1:00 PM to 5:00 PM

1:00 PM - 1:30 PM
GPS-BASED Airspeed Calibration for Rotorcraft: Generalized Application for All Flight Regimes
Denis Hamel,* Alexander Kolarich,* Airbus Helicopters;

1:30 PM - 2:00 PM
Cold Weather Testing of the Bell 525 Relentless
Bradley Regnier,* Joel Baden, Albert Brand, Patrick Lindauer, Joshua O'Neil, John Schillings, Bell;

2:00 PM - 2:30 PM
The Multirotor Test Bed - A New NASA Test Capability for Advanced VTOL Rotorcraft Configurations
Carl Russell,* Sarah Conley, NASA Ames Research Center;

3:00 PM - 3:30 PM
Experimental Measurement of Sectional Stiffness Properties of Composite Rotor Blades
Tyler Sinotte,* Olivier Bauchau, University of Maryland;

3:30 PM - 4:00 PM
Wind Tunnel Testing a Small Isolated Folding Propeller
Luke Battey,* US Army Technology Development Directorate; Carl Russell, NASA Ames Research Center;

4:00 PM - 4:30 PM
Unmanned VTOL Aircraft and Rotorcraft

Unmanned VTOL I
Technical Session A: Tues. October 6, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Manned-Unmanned Teaming Challenges in the Maritime Environment
Jacquelyn Banas, Andreas Cords, Tim Mehling,* Tobias Paul, ESG;

8:30 AM - 9:00 AM
Atmospheric Sampling in Urban Areas and Complex Terrain using UAS Swarms
Jared Cooper,* David Neal, Barron Associates, Inc.; Alex Andrekanic, Matthew Paulini, Air Force Research Laboratory Information Directorate; Stephan De Wekker, University of Virginia;

9:00 AM - 9:30 AM
Rotor Fault Detection and Identification for a Hexacopter Based on Control and State Signals via Statistical Learning Methods
Airin Dutta,* Farhan Gandhi, Fotis Kopsaftopoulos, Michael McKay, Rensselaer Polytechnic Institute;

10:00 AM - 10:30 AM
A Machine-Learning Approach for Time-Optimal Trajectory Generation for UAV's
Di Zhao,* Runyu Lai, Sandipan Mishra, Rensselaer Polytechnic Institute;

10:30 AM - 11:00 AM
A Vision-Based Control Method for Autonomous Landing of Vertical Flight Aircraft On a Moving Platform Without Using GPS
Bochan Lee,* Moble Benedict, Dileep Kalathil, Vishnu Saj, Texas A&M University;

11:00 AM - 11:30 AM
Fuel Cell Application for Small eVTOL UAVs
Thomas Seren,* Mirko Hornung, Technical University of Munich;

11:30 AM - 12:00 PM
Endurance Optimization of a Tandem Helicopter with Variable Speed Rotors and a Spark-Ignition Engine
Mathieu Bouchard,* David Rancourt, Université de Sherbrooke; David Laflamme, Enrick Laflamme, Laflamme Aéro Inc.;

Unmanned VTOL II
Technical Session B: Wed. October 7, 2020 - 8:00 AM to 12:00 PM

8:00 AM - 8:30 AM
Vision-based Autonomous Guidance Approach for a Nano Unmanned Aerial Vehicle Rotorcraft Towards Indoor Flight Environment
Guanlin Wang,* Dehui Li, Panpan Xu, Beijing Intelligent Dynamics Rotorcraft Company;

8:30 AM - 9:00 AM
Concept for an Aeronautical Design Standard (ADS) – Performance Specification for Autonomy Requirements of Military Air Systems
John Preston,* US Army CCDC AvMC;

9:00 AM - 9:30 AM
Development of Automatic Controllers and Piloting Aid Functions for Enhancement of UAV/OPV Autorotation Management
Laurent Binet, ONERA; Christian Brackbill,* David Quinn, US Army, Army Futures Command;

10:00 AM - 10:30 AM
A Contract Based Approach to Collision Avoidance for UAVs
Talgat Alimbayev, A. Agung Julius, Sandipan Mishra, Nicholas Moy, Kaushik Nallan,* Rensselaer Polytechnic Institute;

10:30 AM - 11:00 AM
Prediction on Nonlinear Flight Dynamics of a Quad-rotor UAV with Rotor Aerodynamic Analysis under Gust
Sun Hoo Park,* Sihun Lee, SangJoon Shin, JeongUk Yoo, Seoul National University; Youngmin Park, Korea Aerospace Research Institute;

11:00 AM - 11:30 AM
Optimal Trajectory Generation for a Quadrotor Biplane Tailsitter
Kristoff McIntosh,* Sandipan Mishra, Di Zhao, Rensselaer Polytechnic Institute; Jean Paul Reddinger, CCDC Army Research Laboratory;

11:30 AM - 12:00 PM
Coupled Pitch-Lag Hinge for High Inertia Electric Rotors
Jean-Paul Reddinger,* CCDC Army Research Laboratory;