



Vertical Flight Society 78th Annual Forum & Technology Display



May 10–12, 2022

Ft. Worth Convention Center

Technical Sessions

Special Session schedules listed on the back cover

Technical Session A: Tues. May 10, 2022, 8:00 a.m. to 12:00 p.m.

Main author is listed first and "" denotes the presenting author*

	Acoustics I: Room 201-A Session Chair: Seongkyu Lee University of California, Davis	Aerodynamics I: Room 201-BC Session Chair: Mark Calvert US Army DEVCOM AvMC	Aircraft Design I: Room 202-AB Session Chair: Joon W. Lim US Army DEVCOM AvMC	Crash Safety: Room 202-CD Session Chair: Marv Richards Safe Inc.
8:00 - 8:30 Paper 1	Comparison of Multi-Fidelity Approaches for the HART-II Rotor Noise Prediction Using CREATE™-AV Helios (1195) Zhongqi Jia*, Jeffrey D. Sinsay, Science & Technology Corp.	Effects of Active Flow Control on Fan-In-Wing Aerodynamic Performance in Hover and Forward Flight (1143) Chunhua Sheng*, Qiuying Zhao, University of Toledo	Wing Lift Enhancement from Aft Rotor Induced Suction (1268) Richard Healy*, Farhan Gandhi, Rensselaer Polytechnic Institute	Fatal Rotorcraft Accidents for a Ten-Year Period (1267) Amanda Taylor, NTSB; Joseph Pelletiere*, FAA
8:30 – 9:00 Paper 2	Performance and Acoustics of a Stacked Rotor with Differential Collective Pitch (37) Chloe Johnson*, Jayant Sirohi, University of Texas at Austin; George Jacobellis, Rajneesh Singh, DEVCOM US Army Research Labs	Medium-Fidelity CFD Modeling of Multicopter Wakes for Airborne Sensor Measurements (50) Jonathan Chiew*, Michael Aftosmis, NASA Ames Research Center; Kristen Manies, U.S. Geological Survey	CFD Based Design Optimization of Tail Boom Strake for Hover and Sideward Flight Performance (1273) Furkan Kurban, Alper Ezertas, Osman Gungor*, Murat Senipek, Turkish Aerospace	Development and Analysis of Energy Absorbing Subfloor Concepts to Improve eVTOL Crashworthiness (1179) Jacob Putnam*, Nathaniel Gardner, Justin Littell, Mercedes Reaves, NASA Langley Research Center
9:00 – 9:30 Paper 3	The Effect of Boundary Layer Character on Stochastic Rotor Blade Vortex Shedding Noise (61) Christopher Thurman*, Nicole Pettingill, Nikolas Zawodny, NASA Langley Research Center	High Speed and Highly Efficient Rotor Blade Design (1144) Byung-Young Min, Alex Dunn*, Annie Gao, Vera Klimchenko, Claude Matalanis, Brian Wake, Sikorsky, a Lockheed Martin Co.	The Effect of Blade Tip Sweep Angle on Forward Flight Performance of a High-speed Helicopter (1236) Keita Kimura*, Masahiko Sugiura, Yasutada Tanabe, Japan Aerospace Exploration Agency	Advanced Seat Belt System for Occupant Restraint (1241) Marv Richards*, Safe Inc.
Refreshment Break: 9:30 – 10:00 a.m.				
10:00 - 10:30 Paper 4	Numerical Analysis of Rotor Aeroacoustic Scattering Characteristics Considering Fuselage Aerodynamic Configuration Parameters (1302) Weicheng Bao*, Xi Chen, Dazhi Sun, Qijun Zhao, Nanjing University of Aeronautics and Astronautics	Experimental Evaluation of the Aerodynamic Rotor/Propeller Interactions on High Speed Helicopters, Efforts and Velocity Fields Measurements (45) Lauriane Lefevre*, Jérôme Delva, Vianney Nowinski, ONERA; Antoine Dazin, ENSAM	Acoustic Analysis for Conceptual Design via Comprehensive Analysis (1234) Matthew Floros, Phuriwat Anusonti-Inthra, Michael Avera, George Jacobellis*, DEVCOM Army Research Lab	Test and Analysis Methodology for Validating Crashworthiness of AW609 Tiltrotor (1310) Ryan Miller*, Jim Waterman, Agusta Westland Philadelphia Corp.; Andrea Di Renzo, Fabrizio Turconi, Leonardo Helicopters; Marco Anghileri, Politecnico di Milano
10:30 - 11:00 Paper 5	Aeroacoustic Prediction and Validation of Variable RPM Rotors and Rotor-Airframe Interactions for Advanced Air Mobility Applications (1274) Mrunali Botre*, Daniel Wachspress, Continuum Dynamics; Kenneth Brentner, Ze Feng Gan, Pennsylvania State University	High-fidelity Numerical Investigation of Complex Propeller Flows (1139) Tao Zhang*, George Barakos, Ross Higgins, University of Glasgow	Helicopter Rotor Blade Planform Optimization Using Parametric Design and Multi-Objective Genetic Algorithm (1160) Yonghu Wenren*, Luke D. Allen, Robert B. Haehnel, US Army ERDC CRREL; Joon W. Lim, US Army CCDC AvMC; Ian D. Dettwiller, US Army ERDC ITL	
11:00 - 11:30 Paper 6	Trailing-Edge Noise Predictions of Rotorcraft Airfoils (95) Hyunjune Gill*, Seongkyu Lee, University of California, Davis	Propeller Ground and Ceiling Effect in Forward Flight (72) Jielong Cai*, Sidaard Gunasekaran, University of Dayton	Effect of Lifting Surface and Tail Configuration on the Aerodynamics and Flight Mechanics of VTOL Aircraft (1237) Abhijnan Dikshit, Shawn Lim Kin Yip*, Tom C.A. Stokkermans, James Wang, Nanyang Technological University	
11:30 AM - 12:00 PM Paper 7	Analytic Prediction of Rotor Broadband Noise with Serrated Trailing Edges (54) Sicheng (Kevin) Li*, Seongkyu Lee, University of California, Davis			

Technical Session A: Tues. May 10, 2022, 8:00 a.m. to 12:00 p.m.

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	eVTOL I: Room 200 Session Chair: Jayant Sirohi University of Texas, Austin	Handling Qualities I: Room 204-AB Session Chair: Jeffery Lusardi US Army	Modeling and Sim. I: Room 203-BC Session Chairs: Mike Jones, Systems Tech. Inc. Jan Goericke, Adv. Rotorcraft Tech.	Product Support: Room 100 Session Chair: Danielle Dutcher US Army
8:00 – 8:30 Paper 1	Development Of eVTOL Aircraft For Urban Air Mobility At Joby Aviation (1185) Alex Stoll*, JoeBen Bevirt, Joby Aviation	Hover Dynamics & Flight Control of a UAM-Scale Quadcopter with Hybrid RPM & Collective Pitch Control (1177) Ariel Walter*, Farhan Gandhi, Michael McKay, Robert Niemiec, Rensselaer Polytechnic Institute; Tom Berger, US Army CCDC AvMC	Rotorcraft Pitch-Surge Motion Cueing Requirements for a Simulated Offshore Approach Task (94) Josephine Roscoe*, Steven Hodge, Gareth Padfield, Mark White, University of Liverpool	Optimizing Battery Life in Conventional Helicopters: Selection, Charging, Storage, and Maintenance (22) Mike Neus*, Jerome Powell, Collin Zreet, Bell
8:30 – 9:00 Paper 2	Power System Characterization and Flight Testing of a >55lb Hybrid-Electric Multicopter (1214) Michael Ricci*, Vishaal Varahamurthy, LaunchPoint EPS; Robert Hicks, Offshore Aviation	Flight Test of Scaled MTEs for VTOL Certification using an Ultralight Coaxial Helicopter (16) Tim Jusko*, German Aerospace Center (DLR); Michael Jones, Systems Technology Inc.; Benedikt Grebing, edm aerotec GmbH	Evaluation of Simulator Cueing Fidelity for Rotorcraft Certification by Simulation (1123) Philipp Podzus*, Michael Jones, German Aerospace Center; Paul Breed, Jur Crijnen, Stefan van't Hoff, Royal Netherlands Aerospace Centre	Automated Tracking and Forms Management of Serialized Parts (1168) Steve Schoonveld*, GE Aviation; Mike Augustin, Corey Pearce, AVX Aircraft Co.; Dy Le, Texas Tech University; John Moffatt, US Army DEVCOM
9:00 – 9:30 Paper 3	Electromechanical Modeling and Testing of a Phase-Controlled Stacked Rotor (1240) Matthew Asper*, Jayant Sirohi, University of Texas at Austin; Jack Brewer, Michael Ricci, LaunchPoint EPS	Toward a UAS Handling Qualities Specification: Development of UAS-Specific MTEs (1187) Christina Ivler*, Kate Russell, University of Portland; Tom Berger, Mark Lopez, Anthony Gong, US Army	Comprehensive Analysis of a Control Loading System for a Rotary Wing Flight Simulator (1166) Giorgio Guglieri, Marco Rinaldi*, Politecnico di Torino; Pierluigi Capone, ZHAW	Scheduled Maintenance Program Development for the Leonardo AW609 Tiltrotor via the Maintenance Review Board Process Utilizing MSG-3 (1243) Titos Gosalvez*, Nicholas Flynn*, Leonardo Helicopters
Refreshment Break: 9:30 – 10:00 a.m.				
10:00 - 10:30 Paper 4	Fabrication, Testing, and Comparative Analysis of Lithium Sulfur and Lithium-Ion Electrochemistries (1257) Emily Fidler*, Anubhav Datta, University of Maryland	Analysis of Handling Qualities for an Urban Air Mobility (UAM) eVTOL Quadrotor with Degraded Disturbance Rejection and Control Response (1285) Jeremy Aires*, Carlos Malpica, Stefan Schuet, Shannah Withrow-Maser, NASA Ames Research Center; Allen Ruan, Science & Technology Corp.	Dual-Engine Failure Emergency Procedure Development Using an Engineering Simulator (1190) Ilgaz Doga Okcu*, Kaan Sansal*, Ilker Uysal, Gokhan Virlan, Turkish Aerospace	Bolt Hole Corrosion and Fatigue Damage Repair in Hybrid Vertical Lift Structure (1244) Jude Restis*, Mike Dubberly, Partworks
10:30 - 11:00 Paper 5	Design of a Rotary Engine based High-Power Density Hybrid-Electric Power Generation Testbed (1278) Roydon Fernandes*, Richard Anderson, Kyle Collins, Patrick Currier, Mariana Gehrman, Nicholas Miller, Jayaprakash Shivakumar, Embry Riddle Aeronautical University	Handling Qualities Considerations in Control Allocation for Multicopters (1186) Christina Ivler*, Will Hunter, Kate Russell, Emily Vo, University of Portland; Carlos Malpica, Shannah Withrow-Maser, NASA Ames Research Center	Global Model Identification for a Coaxial Helicopter (1199) Barzin Hosseini*, Aaron Barth, Manfred Hajek, Florian Holzapfel, Lukas Maier, Julian Rhein, Franz Sax, Technical University Munich; Benedikt Grebing, edm aerotec GmbH	Application of MSG-3 Maintenance to the Bell 525 (1269) Corey Mooney, Jim Ciazinski*, Bell
11:00 - 11:30 Paper 6		Evaluation of Pilot Assistance Systems for Helicopter Ship Deck Landing (1147) Alexander Štrbac*, Anthony Gardner, Daniel Greiwe, Arti Kalra, Malte-Jörn Maibach, German Aerospace Center	System Identification and Stitched Modeling of the ADAPT[trade] Winged Compound Helicopter Scaled Demonstrator (8) Samuel Nadell*, Tom Berger, Mark Lopez, US Army DEVCOM AvMC; Christopher Dimarco, Piasecki Aircraft Corp.	Rotorcraft Digital Twin: Exploiting On-board Data for Enhancing Sustainment and Operational Availability (1206) Avinash Sarlashkar, Raymond Beale, Matt Harrigan*, Jared Kloda, Mark Kruse, Dennis Vanill, Sikorsky, a Lockheed Martin Company
11:30 AM - 12:00 PM Paper 7		Evaluation of Helicopter Ship Deck Landing Control Laws in Piloted Simulations (1148) Arti Kalra*, Malte-Jörn Maibach, Alexander Štrbac, German Aerospace Center		

Technical Session B: Wed. May 11, 2022, 8:00 a.m. to 12:15 p.m.

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	Aerodynamics II: Ballroom C Session Chair: Manuel Kessler University of Stuttgart	Aircraft Design II: Room 202-AB Session Chair: Andy P. Bernhard Sikorsky, a Lockheed Martin Co.	Systems Eng./Avionics & Systems Joint Session: Room 100 Session Chairs: Jim Garman, Sikorsky a LMCO Harold Tiedeman, Collins Aero.	Dynamics I: Room 201-A Session Chair: Jonathan Rogers Georgia Institute of Technology
8:00 – 8:30 Paper 1	Computational Analysis of a Quiet Single-Main Rotor Helicopter for Air Taxi Operations (59) Patricia Ventura Diaz, * David Garcia, Seokkwan Yoon, NASA Ames Research Center	Design and Optimization of Innovative Tiltrotor Wing Control Surfaces through Coupled Multibody-mid-fidelity Aerodynamics Simulations (1174) Alberto Savino*, Alessandro Cocco, Alessandro De Gaspari, Andrea Zanoni, Alex Zanotti, Politecnico di Milano; João Cardoso, Daniel Carvalhais, CEiiA; Vincenzo Muscarello, RMIT 34	High Preview of an Enterprise Product Architecture (EPA) to Support a Modular Open Systems Approach (MOSA) (1226) Thomas DuBois*, JHNA	Higher Harmonic Control Simulation with Actuators Designed by the Physics-Based Approach (1212) Kunhyuk Kong*, Byeonguk Im, Sangjoon Shin, Seoul National University
8:30 – 9:00 Paper 2	Uncertainty Quantification Approach for Rotorcraft Simulations (1239) Buvana Jayaraman, * Rohit Jain, Andrew Wissink, US Army CCDC AvMC; Manas Khurana, Science & Technology Corp.	Structural Optimization of a Co-Axial Compound Rotorcraft by using Three-Dimensional Finite Element Representation (69) SunHoo Park*, TaeYong Chun, ByeongUK Im, Sangjoon Shin, Seoul National University	High Sikorsky Airframe Full Spectrum Customer/Supplier Collaboration (1122) Darryl Toni*, Sikorsky, a Lockheed Martin Co.	Model-Based Optimization of a Tethering Device for Ultralight Helicopters (97) Benjamin Rothaupt*, Walter Fichter, University of Stuttgart; Benedikt Grebing, edm aerotec GmbH
9:00 – 9:30 Paper 3	Transient and Quasi-steady Numerical Simulations of Tiltrotor Conversion Maneuvers (1173) Steven Tran, * Hyeonsoo Yeo, US Army CCDC AvMC	Rotorcraft Conceptual Design Methodology by Using Fully Parametric CAD Model with Embedded Empirical Formulations (108) Hasan Ibacoglu, Abdullah Enes Coskun*, Tolga Kayabasi, Turkish Aerospace Industries, Inc.	Fifty Years of Innovation in Performance Limit Indicator (A Success Story of Airbus Helicopters) (38) Serge Germanetti*, Airbus Helicopters	Evolution in Buffet Loads Determination for Tilt Rotor (1126) Carlo Cassinelli, Maria Ludovica Dall'Aglio*, Nicola Donini, Alberto Angelo Trezzini, Leonardo Helicopters
Refreshment Break in Exhibit Hall: 9:30 – 10:15 a.m.				
10:15 - 10:45 Paper 4	Time Efficient Methodology for the Evaluation of Aerodynamics and Flight Mechanics of the RACER Compound Helicopter in Hover under Cross Wind Conditions (1121) Ronan Boisard, * ONERA	Design, Development, and Flight Testing of a 25-Kilogram Quad-Cyclocopter (1260) Ramsay Ramsey*, Moble Benedict, David Coleman, Saul Sanchez, Texas A&M University; Atanu Halder, Embry-Riddle Aeronautical University	Mission System Needs for Small Unmanned Systems (1170) Max Taylor, Matthew Cunnien*, James Kleveland, Collins Aerospace	Relative Rotor Phasing for Vibratory Load Minimization for a Coaxial Multicopper (60) Gaurav Makkar*, Farhan Gandhi, Robert Niemiec, Rensselaer Polytechnic Institute
10:45 - 11:15 Paper 5	Quasi-Steady Aeromechanic Helicopter Simulations Using Mid-Fidelity Aerodynamics (65) Philipp Kunze, * German Aerospace Center); Tobias Ries, Airbus Helicopters	Design and Test of an Active Pneumatic Trailing Edge Flap for High-Speed Rotorcraft (1130) Matt DiPalma*, Preston Bates, Tim Conti, Claude Matalanis, Sikorsky, a Lockheed Martin Co.; Joe Szefi, Invercon LLC	Accuracy Improvement Methods to a Deep Neural Network Model in Computer Vision (40) Grace Chryssilla*, The Boeing Co.	H145 New Comfort Experience: Upgrading From Four-Bladed HMR To Five-Bladed BMR (1146) Raphael Rammer*, Oliver Dieterich, Stefan Dreher, Martijn Priems, Airbus Helicopters
11:15 - 11:45 Paper 6	High-fidelity Simulations of Rotors in Compact Configuration (1235) Sebastian Miesner*, Manuel Keßler, Ewald Krämer, University of Stuttgart	Modeling and Optimization of Propulsion Systems for eVTOL Aircraft (1181) Willem Anemaat*, Drew Darrah, Wanbo Liu, Bruno Moorhamers, Design, Analysis and Research Corporation	Observers for Robust Rotor State Estimation (1128) Omkar Halbe*, Manfred Hajek, Florian Holzapfel, Technical University Munich	An Integrated Three-Dimensional Aeromechanical Analysis of Lift Offset Coaxial Rotors (83) Mrinalgouda Patil*, Paulo Arias*, James Baeder, Anubhav Datta, University of Maryland
11:45 am - 12:15 pm Paper 7	Experimental Evaluation of Multi-Rotor Aerodynamic Interactions (1182) Daley Wylie,* Abraham Atte,* Juergen Rauleder, Georgia Institute of Technology	Examining a Tandem-Rotor Configuration for the Electric Urban Air Mobility Mission (90) Erik Scott*, University of Maryland	Evaluation of Flight Control System Architectures for the AH-64 (109) Bryan Chu*, Russell Enns, Gary Klein, The Boeing Co.	Lichten Runner-up Paper: High-Fidelity Modelling of Actuation Systems for Nonlinear Aeroservoelastic Analysis of Tiltrotor (1163) Federico Pellegrino*, Alberto Angelo Trezzini, Leonardo Helicopters; Giuseppe Quaranta, Politecnico di Milano
12:15 - 12:45 Paper 8			An Evaluation of Human Performance with a Large Area Touchscreen in a Simulated Rotary Wing Environment (113) Margaret Lampazzi, Jason Browning, Sikorsky; Catherine Daly*, Kathryn Guy, Sikorsky/LMCO	

Technical Session B: Wed. May 11, 2022, 8:00 a.m. to 12:15 p.m.

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	eVTOL II: Room 200 Session Chair: Jayant Sirohi University of Texas, Austin	Handling Qual. II: Room 204-AB Session Chair: Jeffery Lusardi US Army	Modeling Sim. II: Room 203-BC Session Chairs: Mike Jones, Systems Tech. Inc. Jan Goericke, ART	Propulsion I: Room 202-CD Session Chair: John Mordosky Boeing Co.	Unmanned I: Room 201-BC Session Chair: Jack Langelaan Pennsylvania State Univ.
8:00 - 8:30 Paper 1	Drag Performance Degradation Due to Icing of eVTOL (1202) Geoffrey Karli*, Jose Palacios, Sihong Yan, Penn State; Robert McKillip, Continuum Dynamics Inc.	Seeking Lift Share: Design Tradeoffs for a Winged Single Main Rotor Helicopter (62) Mark Lopez*, Tom Berger, Eric Tobias, US Army CCDC AvMC; Emily Glover, Ashwani Padthe, San Jose State University	Implementation and Linearization of a Rotor Simulation with a State-Space Free-Vortex Wake Model (6) Umberto Saetti*, Auburn University; Joseph Horn, Pennsylvania State University	Dynamic Load Analysis of Motion Converter Ball Bearings in a Pericyclic Transmission (89) Nick Weinzapfel*, Nathan Bolander, Sentient Science; T. Mathur, AgustaWestland; E. Smith, Penn State; H. DeSmidt, Univ. of Tennessee	A Novel Co-simulation Framework for Verification & Validation of GNC Algorithms for Autonomous UAV (77) Victor Dezobry*, Federico Cappuzzo, Siemens; D. Bianchi, S. Di Gennaro, Università degli Studi dell'Aquila
8:30 - 9:00 Paper 2	Comprehensive Simulation for eVTOL Aircraft-Diagnosing Coupled Airframe-Propulsion Dynamic Instabilities (53) Felix Brenner, Llorenc Foraste Gomez, Patrick O'Heron*, Gamma Tech.; J. Goericke, M. Hasbun, ART	Neuromuscular Response Comparison for Center and Side Stick Positions (1216) Edward Bachelder*, San Jose State University; Bimal Aponso, Federal Aviation Administration; Jeff Lusardi, US Army CCDC AvMC	Implementation and Linearization of a State-Space Free-Vortex Wake Model for Flapping-Wing Flight (5) Umberto Saetti*, Auburn University; Joseph Horn, Pennsylvania State University	Relative Adhesive Wear Performance of Rolling Element Bearing Material Pairs (96) Robert Sadinski, Carl Hager*, Dave Prock, Timken Company	Transition Trajectory Planning & Control for Quadrotor Biplanes in Obstacle Cluttered Environments (1228) Kristoff McIntosh*, Jae Woo Kim, Sandipan Mishra, RPI, J.P. Reddinger, DEVCOM Army Research Lab
9:00 - 9:30 Paper 3	Flight Characteristics of AAM/UAM-Scale Quadcopters Under Atmospheric Turbulence (1129) Matthew Bahr*, Etana Ferede, Farhan Gandhi, Rensselaer Polytechnic Institute	Towards Handling Qualities and Automation Assessment for Certification of eVTOL Aircraft (1261) Michael Jones, David Klyde*, Systems Tech.; R. Schaller, D. Sizoo, D. Webber, J. van Houdt, FAA; R. Simmons, NASA/FAA Ret.; D. Mitchell, Mitchell Aero.; M. Feary, NASA ARC.; M. Schubert, Tiltrotor Flight Test Consulting	A Multirotor Inflow Model Based on Combined Momentum Theory and Simple Vortex Theory (CMTSVT) for Flight Simulations (42) Feyyaz Guner*, German Aerospace Center	Integrating a Torque Measurement System for the GE T408 Engine into a CH-47D Chinook (99) Daniel Kakaley*, Scott Kennedy, Caryn Kopay, Gary Martin, Parker LORD; R. Kyff, GE Aviation; G. Lane, K. Durbin, US Army DEVCOM AvMC; K. Ignatuk, Boeing Co.	Feature-Based Vision for Stochastic Motion Tracking Under Partial Occlusion (1208) Abhishek Shastry*, Inderjit Chopra, Anubhav Datta, University of Maryland
Refreshment Break in Exhibit Hall: 9:30 - 10:15 a.m.					
10:15 - 10:45 Paper 4	Experimental Evaluation of Panel-Method-Based Path Planning for eVTOL in a Scaled Urban Environment (1215) Zeynep Bilgin*, Ilkay Yavrucuk, Middle East Tech. Univ.; Murat Bronz, ENAC	An Explanation of Unanticipated Yaw Phenomenon on Helicopters (1125) David Ferullo*, Airbus Helicopters	Design, Modeling, and Flight Dynamics Analysis of Generic Lift-Offset Coaxial Rotor Configurations (1131) Ashwani Padthe*, Emily Glover, San Jose State University; T. Berger, M. Lopez, E. Tobias, US Army CCDC AvMC; O. Juhasz, US Naval Academy	CFD Modeling Framework Development for Robust Rotorcraft Design (1140) Shyam Neerarambam*, M. Alexander, C. Berezin, D. Bernier, N. Birtwell, D. Coleman, R. Cotton, J. Frydman, D. Halline, D. Lamb, Sikorsky, a LMCO	Acceleration of Heuristic Motion Planning for Unmanned Aerial Vehicles (1200) Neelanga Thelasingha*, A. Agung Julius, Sandipan Mishra, Kaushik Nallan, Rensselaer Polytechnic Institute
10:45 - 11:15 Paper 5	High-Fidelity Analysis of Six-Passenger Quadrotor Air Taxi Concept (34) Cameron Druyor*, Li Wang, NASA Langley Research Center	NGCTR-TD Tiltrotor Autorotation Numerical Investigation (1120) Fabio Riccardi, Giuliano Prando, Line Up Aviation; Federico Del Grande, Valentina Giuliani, Matteo Pecoraro*, Andrea Ragazzi, Leonardo Helicopters	A Comparison of High-Fidelity Simulation Approaches for Interactional Aerodynamics of Multirotor Systems in Forward Flight (1132) Abhishek Chopra*, Farhan Gandhi, Richard Healey, Onkar Sahni, RPI	Advanced Data analytics for Dynamic Systems Monitoring (1162) Océane Martin, Ammar Mechouche, Emmanuel Mermoz*, Airbus Helicopters	
11:15 - 11:45 Paper 6	Parametric Investigation of Flow over a Rotor-Blown Wing using High-fidelity Simulations (58) Ullhas Udaya Hebbar*, Farhan Gandhi, Onkar Sahni, RPI	Load Alleviation Control vs. Load Limiting Control: Pros and Cons. (1255) Chams Eddine Mballo*, J.V.R Prasad, Georgia Institute of Technology	Physics and Improved Simulations for Computational Modeling of Synthetic Jets (1172) Aaron Crawford*, Marilyn J. Smith, Georgia Institute of Technology	Dynamic Simulation of a Rotor System with Variable Speed (1217) Michael Weigand*, M. Bischläger, A. Poks, J. Koch, Technical University; C. Gross, Zoerkler Gears	
11:45 am - 12:15 pm Paper 7	Advanced Thermal Analysis Methodologies to Support eVTOL Propulsion System Optimization (1288) Lee Rogers * Thomas Holdstock, Drive System Design				

Technical Session C: Wed. May 11, 2022, 1:45 to 6:00 p.m.

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	Acoustics II: Room 100 Session Chair: James Baeder University of Maryland	Adv. Vertical Flight I: Room 202-AB Session Chair: Moble Benedict Texas A&M University	Aerodynamics III: Ballroom C Session Chair: Juergen Rauleder Georgia Institute of Tech.	Crew Stations I: Room 201-A Session Chair: Karen Feigh Georgia Institute of Tech.
1:45 – 2:15 Paper 1	Helicopter Noise Source Separation Using an Order Tracking Filter (30) Joel Sundar Rachaprolu*, Eric Greenwood, Pennsylvania State University	Transition Performance of Tilt Propeller Aircraft (1189) Alex Stoll*, Gregor Veble Mikić, Joby Aviation	Analytical Model Development for Rotors Hovering Above Heaving Surfaces (1299) Joseph Milluzzo*, Scott Davids, US Naval Academy; John Tritschler, US Naval Test Pilot School	Further Simulated Flight Trial Assessment of Novel Autorotation Cueing Methods (1201) Mushfiqul Alam*, Cranfield University; Jonathan Rogers, Georgia Institute of Tech.; Michael Jump*, University of Liverpool
2:15 – 2:45 Paper 2	Measured Acoustic Characteristics of Low Tip Speed eVTOL Rotors in Hover (1253) Jonathan Fleming*, Jacob Gold, Matthew Langford, Technology in Blacksburg, Inc.; Kyle Schwartz, David Wisda, AVEC, Inc.; Nathan Alexander, Jeremiah Whelchel, Virginia Polytechnic State University	Robotic Hummingbird versus Quadrotor: a Flight Dynamics and Gust Response Comparison (1272) David Coleman*, Moble Benedict, Texas A&M University	Helicopter Shipboard Operation: Effect of Atmospheric Boundary Layer on Turbulent Ship Airwake and Rotor Aerodynamic Loads (1220) Neda Taymourtash, Alberto Guardone, Myles Morelli, Giuseppe Quaranta*, Politecnico di Milano	Differential Role of Gravito-inertial Cues for Active and Passive Control in Degraded Visual Environments (1314) Martine Godfroy-Cooper*, Edward Bachelder, Joel Miller, San Jose State University; Benoit Bardy, Euromov; Jean-Christophe Sarrazin, ONERA
2:45 – 3:15 Paper 3	Ground-based Acoustic Measurements of Small Multirotor Aircraft (1211) Nicholas Blaise Konzel, Eric Greenwood*, Pennsylvania State University	Blade Shape Optimization of Mars Helicopter Exploring Pit Craters (93) Masahiko Sugiura*, Keita Kimura, Akira Oyama, Hideaki Sugawara, Yasutada Tanabe, Japan Aerospace Exploration Agency; Y. Buto, M. Sato, K. Yoshikawa, Kogakuin University; M. Kanazaki, D. Kikuchi, Y. Kishi, Tokyo Metropolitan University; T. Minajima, Tokyo University of Agriculture & Tech.	Automated Inference of Vortex Core Physics of Hovering Rotor Wakes Using Machine Learning Techniques (1280) Jennifer Abras*, Nathan Hariharan, HPCMP CREATE™	3D Conformal Pilot Cueing for Rotorcraft Shipboard Landings: On-Demand Trajectory Generation used with a Flight Path Marker Cue (1175) Robert Walters*, Karen Feigh, Mahmoud Hayajneh, J.V.R. Prasad, Georgia Institute of Technology
Refreshment Break in Exhibit Hall: 3:15 – 4:00 p.m.				
4:00 – 4:30 Paper 4	A Realistic Rotorcraft Noise Footprint Computation for Low-Noise Trajectory Optimization (74) Pierre Dieumegard*, Julien Caillet, Frédéric Guntzer, Airbus Helicopters; Sonia Cafieri, Université de Toulouse	Optimization of Coaxial Rotor System for a Gun-launched Micro Air Vehicle (24) Hunter Denton*, Moble Benedict, Texas A&M University; Hao Kang, US Army Research Lab	Large Eddy Simulation of the Wakes of Three Urban Air Mobility Vehicles (63) Denis-Gabriel Caprace*, Andrew Ning, Brigham Young University	Development and Evaluation of Coupling Modes and Haptic Functions enabled by Active Inceptor integration in Cockpits (1145) Laurent Binet*, Raphaël Perret, ONERA
4:30 – 5:00 Paper 5	Flyover Noise Comparison Between Joby Aircraft and Similar Aircraft (1180) Jeremy Bain*, Greg Goetchius, David Josephson, Joby Aviation	Hoverfoil™ Design and Testing (1282) Kelly Echols, Randall Petersen*, LeVanta Tech LLC	Investigation of Dynamic Stall Leading-Edge Flow Features at a Low Transitional Reynolds Number (103) Jagdeep Bather, Seongkyu Lee,* University of California, Davis	
5:00 – 5:30 Paper 6	Variation in Helicopter Noise During Approach Maneuvers (1277) Damaris Zachos*, Kenneth Brentner, Eric Greenwood, Lauren Weist, Pennsylvania State University	Steady & Transient Hover Performance Investigation of Electric Medium-sized Variable-RPM Rotor (1259) Peter Ryseck*, Inderjit Chopra, University of Maryland; Rajneesh Singh, DEVCOM Army Research Lab; Mark Lopez, US Army DEVCOM AVMC; Emily Glover, San Jose State University		
5:30 – 6:00 Paper 7	Analysis of Rotor Noise during Maneuvering Flight based on CLORNS Solver (1291) Xi Chen*, Muyang Lin, Weiqi Wang, Qijun Zhao, Nanjing University of Aeronautics and Astronautics			

Technical Session C: Wed. May 11, 2022, 1:45 to 6:00 p.m.

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	Dynamics II: Room 202-CD Session Chair: Jonathan Rogers Georgia Institute of Technology	Modeling & Simulation III: Room 203-BC Session Chair: Mike Jones, Systems Tech. Inc. Jan Goericke, ART	Safety: Room 200 Session Chair: Alexia Payan Georgia Institute of Tech.	Structures & Materials I: Room 204-AB Session Chair: Larry Pilkington Columbia Helicopters	Test & Evaluation I: Room 201-BC Session Chair: Donald Byrne Boeing Co. (Ret.)
1:45 - 2:15 Paper 1	Pilot Biomechanics for the Definition of a Rotorcraft-Pilot Interaction Experiment (118) Andrea Zaroni, A. Cocco, D. Marchesoli, Pierangelo Masarati* C. Talamo, Politecnico di Milano; F. Colombo, E. Fosco, S. Kemp, Leonardo Helicopters	A Comparative Assessment of the NATO-GD and SFS2 Ship Airwakes and their Influence upon Helicopter Aerodynamic Loading (1222) Nicholas Fernandez*, Ieuan Owen, Neale Watson, Mark White, University of Liverpool	Safety Considerations on the Operation of Electric Vertical and Takeoff Landing (VTOL) Aircraft at Airports and Vertiports (104) Gaël Le Bris*, Loup-Giang Nguyen, WSP USA	The Application of Sandwich Technology to the Airframe Structure of Helicopters (73) Rainer Arelt*, Jan-Christoph Arent, Mathias Dambaur, Stefan Goerlich, Benjamin Hailer, Airbus	Automatic Category A Takeoff for H145 – Development and Flight Testing (111) Carl Ockier*, Paul Prevost, Daniel Reber, Marc Salesse-Lavergne, Airbus
2:15 - 2:45 Paper 2	On the Impact of Flight Control Systems on Kinetosis of Helicopter Passengers (44) Süleyman Özkurt*, Walter Fichter, University of Stuttgart; Christian Fischer, Airbus Helicopters; Heinrich Bühlhoff, Max Planck Society	The Effect of Lift Position on Helicopter Recovery to a Twin-Island Aircraft Carrier (1151) Neale Watson*, Ieuan Owen, Mark White, University of Liverpool; Richard Lynn, QinetiQ	The Safety of Advanced Air Mobility and the Effects of Wind in the Urban Canyon (1152) Sharon Schajnoha, Maryam Al Labbad, Guy Larose*, RWDI; Hali Barber, Alanna Wall, National Research Council Canada	Development of a 3D Braided Preform for a Rotorcraft Flex-beam (1127) Christopher Pastore*, T. Liao, Thomas Jefferson Univ.; B. Ong, Consultant; H. Lam, DE Tech.; T. Chen, S. Ng, US Navy; D. Nguyen, Sikorsky, a LMCO	Full-Scale Investigation of Rotor/Obstacle Interactions using an Elevated Fixed Platform (1153) Mark Silva*, Eric Hayden, Leighton Myers, US NAVAIR; John Holder, John Tritschler* US NAWCAD
2:45 - 3:15 Paper 3	Cheeseman Award Paper: Damper Model Identification Using Hybrid Physical and Machine Learning Based Approach (1322) Michele Zilletti* Ermanno Fosco, Leonardo Helicopters	Towards Certification by Simulation with model-based continuous Engineering Processes showcased on eVTOL Application (1242) Marcel Gottschall, Bastian Binder, Alexis Castel*, ESI Group	Physics-Based Detection of the Proximity to Loss of Tail Rotor Effectiveness Within the Helicopter Flight Data Monitoring Program (41) Paola Zanella*, Concepts Beyond; Charles Johnson, FAA; Dimitri Mavris, JVR Prasad, Georgia Institute of Technology	Vitrimer Carbon Fiber Composites for Rotorcrafts Components with Fatigue Reverse Ability (1141) Mithil Kamble*, Nikhil Koratkar, Catalin R Picu, Sikharin Pranompont, RPI	Flight Test Validation of Thrust Axis Tactile Cueing System on AW609 Tiltrotor (1262) Lucia DeNicola*, Luca Belluomini, Ahmad Haidar, Sid Xiao, Leonardo Helicopters
Refreshment Break in Exhibit Hall: 3:15 – 4:00 p.m.					
4:00 - 4:30 Paper 4	Blade Load Reconstruction from Embedded Strain Measurements (1198) Pierangelo Masarati, P. Bettini, D. Rigamonti, Carmen Talamo* Politecnico di Milano; D. De Gregoriis, R. Cumbo, Siemens	Verification, Validation and Calibration Under Uncertainty for a Scaled Experimental Rotor Model (64) Neda Taymourtash, Giuseppe Abate, Matteo Daniele, Giuseppe Quaranta*, Politecnico di Milano	A Method to Reduce Rotorcraft Development Risk by Integrating Historical Quantitative Risk Assessment into Fault Tree Models (1276) John Hewitt*, Loan (Joan) Pham*, Sikorsky, a LMCO	Nonlinear Finite Element Analysis of a Sharp Radius on the Shank of a Ring Locked Stud (1150) Lin Liu*, David Binney, Sikorsky, a Lockheed Martin Co.	Energy-Maneuverability as a Framework for Performance and Handling Qualities Testing (1300) John Tritschler*, US Naval Test Pilot School; Brandon Dotson, US Army
4:30 - 5:00 Paper 5	The Inter-2-Blade Lead-Lag Damper Concept (117) Pierangelo Masarati*, Leonardo Frison, Andrea Zaroni, Politecnico di Milano	Design and Integration of a Tilt-Rotor Flight Simulation Platform (1167) Stefano Primatesta*, F. Barra, G. Guglieri, Politecnico di Torino; P. Capone, ZHAW	A Structured and Comprehensive Air Vehicle Risk Assessment (76) Laurence Mutuel*, Bell	Housing and Bearing Deformation Interaction of Large Size Bearings (43) Biqiang (Johnny) Xu*, Sikorsky, a Lockheed Martin Co.	Thermodynamic Modeling for the Analysis of Non-Stabilized Flight Test Temperature Data (15) Denis Hamel, Carson Allgood*, Thomas Cooper*, Alexander Kolarich*, Airbus
5:00 - 5:30 Paper 6	Effect of Lag Damper Failure on Helicopter Ground Resonance (1245) Farhan Gandhi*, Jonah Whitt, Rensselaer Polytechnic Institute	XV-15 Rotor Simulation in Flow360 using the Blade Element Theory (1192) John Moore*, Feilin Jia, FlexCompute; Qiqi Wang, MIT		Comparison of Helicopter Component Fatigue Test Results to Analysis (75) James Michael*, Leigh Altman, Nathan Green, Bell	eVTOL Component Testing for Supporting Algorithmic Icing Detection (1248) Robert McKillip*, Continuum Dynamics
5:30 - 6:00 Paper 7	Time-Frequency Analysis of Experimental and Analytical Hub Loads of a Rotor Undergoing a Rotor Speed Change (39) Martin Sekula*, NASA LARC; Carl Russell, NASA ARC			Improved Strain Gage Instrumentation Strategies for Rotorcraft Blade Measurements (88) Timothy Davis*, US Army DEVCOM AvMC	Lichten Award Paper: Automated Optical Rotor Blade Tip Clearance Tracking Using Artificial Intelligence Algorithms (1325) Timothy Schmidt*, Sikorsky, a LMCO
6:00 - 6:30 Paper 8	Pre-test Analysis on Slowed Mach-scaled Thrust Compounding Rotorcraft (1279) Shashank Maurya*, Inderjit Chopra, Anubhav Datta, University of Maryland				

Technical Session D: Thurs. May 12, 2022, 10:15 a.m. to 12:15 p.m.

Main author is listed first and "" denotes the presenting author*

	Acoustics III: Room 100 Session Chair: Seongkyu Lee University of California, Davis	Crew Stations II: Room 201-A Session Chair: Karen Feigh Georgia Institute of Tech.	HUMS I: Room 202-CD Session Chair: Dale Pluss Collins Aerospace	Manufacturing Tech. I: Room 200 Session Chair: David Misciagna Boeing Co.
Refreshment Break in Exhibit Hall Prior to Session D Start: 9:30 to 10:15 a.m.				
10:15 - 10:45 Paper 1	High Solidity, Low Tip-Speed Rotors for Reduced eVTOL Tonal Noise (1256) Farhan Gandhi*, Justin Pepe, Brendan Smith, Rensselaer Polytechnic Institute	Individual Differences in Cueing Utilization in Rotary-Wing Aviators (66) Kathryn Feltman*, Jason Boggs, Michael Wilson, US Army Aeromedical Research Lab	Ensemble Integration Methods for Load Estimation (1124) Catherine Cheung*, Zouhair Hamaimou, National Research Council Canada	Digital Transformation of a 6000-Year-Old Process (1149) Heather Woodworth*, Sikorsky, a Lockheed Martin Co.
10:45 - 11:15 Paper 2	An Investigation of Flight Control Strategy on Generic eVTOL Noise (1290) Bhaskar Mukherjee*, Kenneth Brentner, Eric Greenwood, Joseph Horn, Jean-Pierre Theron, Pennsylvania State University	Methodology Proposal to Better Integrate Human Factors in Aviation Maintenance. (112) Fabien Bernard*, Georges Devilliers, Raphael Paquin, Airbus Helicopters; Mohsen Zare, Belfort-Montbéliard University of Technology, University of Bourgogne Franche-Comté	Validation of Probabilistic Regime Recognition and Damage Estimation with Large Fleet Datasets (1136) Dakota Musso, Jonathan Rogers*, Georgia Tech; Subhasis Sarkar, Technical Data Analysis, Inc.	Paint Scheme & Marking Digital Transformation (48) Mary DaSilva*, Sikorsky, a Lockheed Martin Co.
11:15 - 11:45 Paper 3	Control Method of the Rotor Noise based on Sound Pressure Cancellation (1309) Yan Ding*, Xi Chen, Rui Hu, Guoqing Zhao, Qijun Zhao, Nanjing University of Aeronautics and Astronautics	Task Analysis and Predictive Workload Modeling for Autonomous Aircraft (116) Margaret Lampazzi, Carl Pankok Jr.*, Sikorsky, a Lockheed Martin Co.	Helicopter Gearbox Mechanical Classification based on Vibration Pattern Recognition (1137) Valerio Camerini*, Valentin Aubin, Ammar Mechouche, Airbus Helicopters	Manufacturing Innovation for Bell's Future Factory (68) Amber Pike*, Bell
11:45 - 12:15 Paper 4		The Portable Helicopter Oxygen Delivery System (PHODS) in the Altitude Chamber: Cerebral and Peripheral Blood Oxygen Saturation and Perceptual Vigilance. (81) Leonard Temme*, Bobby Bowers, Amanda Hayes, Aaron McAtee, Paul St Onge, U.S. Army Aeromedical Research Lab; Dennis Ard, Frank Petrassi, School of Army Aviation Medicine	Rotor Fault Detection and Identification on Multicopters based on Statistical Time-series based Data-Driven Methods: Experimental Assessment via Flight Tests (1265) Airin Dutta*, Farhan Gandhi, Fotis Kopsaftopoulos, Jianxi Wang, Rensselaer Polytechnic Institute	Air Entrapment Prediction in Composite Manufacturing (1154) Michael West*, Yih-Farn Chen, Benjamin Cournoyer, Sikorsky; Felix Nguyen, Lockheed Martin Corp.

Technical Session D: Thurs. May 12, 2022, 10:15 a.m. to 12:15 p.m.

Main author is listed first and "" denotes the presenting author*

	Propulsion II: Room 203-BC Session Chair: John Mordosky Boeing Co.	Struct. & Materials II: Room 204 AB Session Chair: Larry Pilkington Columbia Helicopters	Test & Evaluation II: Room 202-AB Session Chair: Donald Byrne Boeing Co. (Ret.)	Unmanned II: Room 201-BC Session Chair: Jack Langelaan Pennsylvania State University
Refreshment Break in Exhibit Hall Prior to Session D Start: 9:30 to 10:15 a.m.				
10:15 - 10:45 Paper 1	A Semi-empirical Method to Predict Motor Heat Transfer Coefficient for SUAS Conceptual Design (1284) Farid Saemi*, Moble Benedict, Texas A&M University	Verification and Validation (V&V) of Numerical Helicopter Airframe Model for Dynamic and Static Finite Element Analysis (7) Junhyeon Seo, Mayank Agarwal*, Rakesh K. Kapania, Srivatsa Bhat Kaudur, Virginia Polytechnic State University; Courtney Fisher, Larry Pilkington, Columbia Helicopters	Dynamic Stall Investigation on a Rotating semi-elastic Double-swept Rotor Blade at the Rotor Test Facility Göttingen (110) Martin Müller*, Johannes Niklas Braukmann, Armin Weiss, German Aerospace Center	Flight Test Measurement of Quadrotor Performance at Varying Sideslip Angles (1258) Matthew McCrink*, Sage Herz, Dhuree Seth, Ohio State University
10:45 - 11:15 Paper 2	Design Concepts to Meet EASA SC-VTOL-01 Single Failure Criteria (1294) Patrick Darmstadt*, Sheevangi Pathak, The Boeing Co.; Tim Krantz, Mark Valco, NASA Glenn Research Center	Airframe Structural Sizing Automation (1229) Anthony Joseph, Robert Daley*, Anne Koeppel, Sikorsky, a Lockheed Martin Co.	Model Based Blade Attachment Stiffness Evaluation of the MERIT Rotor in Hover with Photogrammetry and Digital Image Correlation (1252) Verena Heuschneider*, Amine Abdelmoula, Florian Berghammer, Manfred Hajek, Technical University of Munich; Jayant Sirohi, University of Texas at Austin	Validation of Scanned Propeller Geometry for Simulation Modeling (1231) Jean-Paul Reddinger*, Michael Avera, Rajneesh Singh, US Army Research Lab DEVCOM
11:15 - 11:45 Paper 3	Rotorcraft Propulsion System Hybridization for Enhanced Safety and Performance (1304) Peter Giannola*, EDG Propulsion LLC; Mars Chan, Dewer; John C. Ho, Expert; Gerry McCann, Mechatronic Machine		RACER Compound Helicopter: Operational Wireless FTI Data Transfer from ROTOR's up to Fuselage (1171) Marc Seznec*, Airbus Helicopters; Jean Grégoire Ivanoff*, Safran DS	Simulation Model Update and Optimized Control Design of a Sub-Scale Flybarless Helicopter (107) Jeffry Walker*, Bihrl Applied Research; Mark Tischler, Tischler Aeronautics
11:45 - 12:15 Paper 4			Practical Aspects of Designing Background-oriented Schlieren (BOS) Experiments for Vortex Measurements (1224) Clemens Schwarz*, Johannes N. Braukmann, German Aerospace Center	A Study of the Influence of Motor-ESC Dynamics on Multi Rotor Vehicle Disturbance Rejection (91) Rhys Lehmann*, Defence Science and Technology Group; Stef Ceelen, TuDelft

Technical Session E: Thurs. May 12, 2022, 1:30 to 5:30 p.m.

Main author is listed first and "" denotes the presenting author*

	Adv. Vertical Flight II: Room 203-BC Session Chair: Moble Benedict Texas A&M University	Aerodynamics IV: Room 201-BC Session Chair: Mark Calvert US Army DEVCOM AvMC	Aircraft Design III: Room 202-AB Session Chair: Joon W. Lim US Army DEVCOM AvMC	HUMS II: Room 202-CD Session Chair: Dale Pluss Collins Aerospace
1:30 – 2:00 Paper 1	Development of a Multi-Rotor eVTOL Using RPM, Collective, and Cyclic Control (1184) Riccardo Roiati*, Richard Anderson, Kyle Collins, Patric Hruswicki, Vivek Saini, Nishant Sharma, Xinyu Yang, Embry Riddle Aeronautical University	A Combined Experimental and Computational Analysis of the Flow Field of a Coaxial Counter-Rotating Rotor in Hover (1157) Patrick Mortimer*, Jayant Sirohi, University of Texas at Austin; Ashwani Padthe, San Jose State University; Jimmy Ho, Mark Lopez, US Army CCDC AvMC	38th Student Design Competition Graduate Winner: ALICORN – 2025 Unmanned Vertical Lift for Medical Equipment Distribution (1323) Dilhara Jayasundara*, Spencer Fishman*, University of Maryland	Exploring Bearing, Shaft and Gear Monitoring using an Optical Fiber Fabry-Perot Bragg Grating Cavity (1164) James Washak*, Christopher Holmes, Ling Wang, University of Southampton; Paul Dunning*, GE Aviation Systems
2:00 – 2:30 Paper 2	Flow-Field and Force Measurements on a Cycloidal Rotor Blade in Forward Flight (1281) Joseph Heimerl*, Moble Benedict, Texas A&M University	Improved Initial and Boundary Conditions for Hovering Rotor CFD Simulations (1196) Feilin Jia*, Philippe Spalart, Qiqi Wang, Flexcompute Inc.	38th Student Design Competition Undergraduate Winner: GARRA – 2025 Unmanned Vertical Lift for Medical Equipment Distribution (1324) Derek Safieh*, Georgia Tech; Andrew Lent*, University of Maryland	Active-Sensing Acousto-Ultrasound-based Rotorcraft Structural Health Monitoring via Adaptive Functional Series Models (1286) Fotis Kopsaftopoulos, Shabbir Ahmed*, Peiyuan Zhou, Rensselaer Polytechnic Institute
2:30 – 3:00 Paper 3	Design, Development, and Flight Testing of a 70-gram Micro Quad-Cyclocopter (1292) Carl Runco*, Moble Benedict, Texas A&M University	Comparing Strategies for DNS Based Optimization of Airfoils for Martian Rotorcraft (33) Lidia Caros*, Oliver Buxton, Peter Vincent, Imperial College London; Julian Blank, Michigan State University	Biomimetic Adaptive Airframe Technologies (BAAT) for Rotorcraft Design and Optimization (1230) Allen Davis*, Moble Benedict, Darren Hartl, Texas A&M University; Bochan Lee, Republic of Korea Navy	Development and Integration of a Fiber-Optical Sensor System for Rotor Blade State Observation (1266) Florian Berghammer*, Manfred Hajek, Verena Heuschneider, Technical University Munich
3:30 – 4:00 Paper 4	Benefits of Dual Propellers for a Coaxial Helicopter (1251) Alexander Stillman*, Farhan Gandhi, Michael McKay, Rensselaer Polytechnic Institute	Numerical Simulations of the Adverse Effects of Rain on Airfoil and Rotor Aerodynamic Characteristics (1203) Aishwerya Gahlot*, Lakshmi Sankar, Georgia Tech; Richard Kreeger, NASA Glenn Research Center; Ritu Eshcol, Siemens PLM Software	Revisiting Legacy Weight Relationships Using Machine Learning Techniques (114) J. Michael Vegh*, Andrew Milligan, US Army DEVCOM AvMC	Improving the Performance of Bearing Analysis (25) Eric Bechhoefer*, Josh Kethan, GPMS Inc.
Refreshment Break: 3:30 – 4:00 p.m.				
4:00 – 4:30 Paper 5	6-DOF Flight Dynamics Model Identification of a Hybrid-Lift Multicopter in Hover (1209) Mitchell Graham*, Subodh Bhandari, Cal Poly Pomona	CFD Simulation of Flow Around ROBIN-Mod7 Fuselage with PSP Rotor Using an Immersed Boundary Method (120) Hee Sung Park*, Daniel Linton, Ben Thornber, University of Sydney		
4:30 – 5:00 Paper 6	M-Star Medical Transport with a Multi-Ducted Angled Rotor Design (1289) Michael Johnson, Stuart Dana, Thomas Johnson, Liza Pierce, SpyDar Sensors Richard Catania*, SpyDar Sensors			
5:00 – 5:30 Paper 7				

Technical Session E: Thurs. May 12, 2022, 1:30 to 5:30 p.m.

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	History: Room 204-AB Session Chair: Erasmio Pinero Bell	Manufacturing & Tech. II: Room 200 Session Chair: David Misciagna Boeing Co.	Operations: Room 201-A Session Chair: Scott Swinsick Boeing Co.
1:30 – 2:00 Paper 1	Ernst Otto Schmidt 1872-1938: Passionate Helicopter Inventor (4) Berend G. van der Wall, Klausdieter Pahlke*, German Aerospace Center (DLR); Gert Dieter Schmidt, Retiree	Computational Analysis of a Model Coaxial Rotor Hub Wake (1233) Forrest Mobley*, James Coder, University of Tennessee Knoxville	The Bambi Bucket: Evolution of the Most Versatile Aerial Firefighting Tool (1178) Robert Roedts*, Columbia Helicopters, Inc.
2:00 – 2:30 Paper 2	God's Machine: The Miracle at Gander (23) Paul Fardink*, US Army (Ret.)	Tolerance Relief on Transmission Castings for Producibility (1318) Brad Gimbutis*, Justin Beardsley, Griffin Palmer, Holly Ann Quinn, Sikorsky, a Lockheed Martin Co.	Expectations, Test Results, and Lessons Learned, Flight Testing an RF DILR ALE (80) Bob Burzynski, Dan Ferrante*, Mike Lengyel, Sid McManus, Elbit America
2:30 – 3:00 Paper 3	A Brief History of Kaman Innovative VTOL Aircraft and System Designs (1207) Jacques Virasak*, Maglev Aero	Sikorsky Leakage Criteria and Prevention Methods (1319) Altayeb Hashim*, Joe Buzzeo, Anthony Chory, Cody Donecker, Sikorsky, a Lockheed Martin Co.	SmartHangars and SAE International Aircraft Charging Standard (1210) Joshua Portlock*, Richard Watson, Electro.Aero Pty Ltd.
3:30 – 4:00 Paper 4			Impact of Transformative Air Vehicle Operations on Logistic Supply Chains (1316) Kaydon Stanzione*, Richard Ruff, Daniel Schrage*, LogistiWerx, Inc.; Suresh Kannan, Nodein Autonomy, Inc.
Refreshment Break: 3:30 – 4:00 p.m.			
4:00 – 4:30 Paper 5			Operations Study on a Multimodal Transport using Cargo eVTOL Aircrafts and High-Speed Rail (1306) Yu Ito, Haruki Tsuge*, Yamato Transport
4:30 – 5:00 Paper 6			Scenario-based study of using Civilian Cargo eVTOL Aerial System for Counter Catastrophic-Disaster Mission (1246) Haruki Tsuge*, Yu Ito, Yamato Transport

Forum 78 Special Session Schedule (Ballroom A, B & C)

Tuesday, May 10

Special Session 1 (8:00 am – 9:30 am): International VTOL R&D

Moderated by Dan Newman, Boeing

- Dr. Noah Schiller, Revolutionary Vertical Lift Technology (RVLT) Associate Project Manager for Technical Challenge Integration, NASA
- Derek Gowanlock, Lead, Canadian Vertical Lift Autonomy Demonstration Project, NRC Canada
- Arnaud LePape, Rotorcraft Program Director, ONERA
- Florian Antrack, Program Manager Defence Technology, DLR
- Pat Collins, DE&S Senior Fellow, UK MoD

Special Session 2 (10:00 am – 12:00 pm): US Future Vertical Workforce

Moderated by Danielle McLean, Hy-Sky

- Russell Julian, Texas UASWERX
- Victoria Natalie, USRI/Oklahoma State University
- Daniel Plaisance, Helmerich Research Center/Oklahoma State University–Tulsa
- Sharon Rossmark, Women And Drones
- Mike Burrows, San Bernadino International Airport
- Vineet Sahasrabudhe, Sikorsky, a Lockheed Martin Co.

Opening General Session

Welcome & Keynote (1:30 – 2:00 pm):

- Welcome: Mike Hirschberg
- Keynote: Maj Gen Michael Keating, UK Army Air Corps; Deputy Commanding General, III Corps, US Army

Straight Talk from the Top (2:00 – 3:30 pm)

Moderated by Elan Head, Senior Editor, The Air Current

- Paul Lemmo, President, Sikorsky
- Keith Flail, EVP, Advanced Vertical Lift Systems, Bell
- Roberto Garavaglia, SVP Strategy and Innovation, Leonardo
- Shane Openshaw, Boeing VP of Tiltrotor Programs, Boeing
- Tomasz Krynski, VP Research & Innovation, Airbus

Nikolsky Lecture (4:00 – 5:00 pm):

Moderated by Harry Nahatis, VP/GM, GE Aviation

- Prof. Marilyn Smith, Director, Georgia Tech Vertical Lift Research Center of Excellence and Professor, Daniel Guggenheim School of Aerospace Engineering, “Computational Vertical Lift Aeromechanics and Its Future in the Twenty-First Century”

Wednesday, May 11

Special Session 3 (8:00 – 9:30 am):

PEO Aviation MOSA Progress & Collaboration

Moderated by Mr. Pat Mason, Deputy PEO Aviation, US Army

- COL Scott Anderson, US Army, PM UAS
- COL Burr Miller, US Army, PM AMSA
- Matt Sipe, Director, MOSA Transformation Office

Special Session 4 (10:00 am – 12:00 pm):

Army Aviation Modernization Update

Moderated by Mr. Pat Mason, Deputy PEO Aviation, US Army

- Ski Horrocks, Deputy PM, FARA
- Alan McClendon, Chief Engineer, Utility Helicopters
- Viva Kelley, Deputy PM, Cargo Helicopters
- Bob Sheibley, Deputy PM, Advanced Turbine Engines

Special Session 5 (1:30 pm – 3:30 pm):

Flight Test

Moderated by Dyan Gibbens, Strategic Advisor and Acting CTO, AFWERX

- Col Nathan Diller, Director, AFWERX, USAF
- Matt Chasen, CEO, LIFT Aircraft
- Lt Col Thomas Meagher, USAF, AFWERX Prime Lead
- Rick Simmons, VFS E-VTOL Flight Test Council
- Sterling Alley, AFWERX Technology Transition Lead

Special Session 6 (4:00 – 6:00 pm):

US Navy/Marine Technical Briefings (hybrid)

Moderated by Michael Fallon, NAVAIR

- Col. Jack Perrin, USMC, H-53 Program Manager
- Col. Brian Taylor, USMC, V-22 Joint Program Manager
- Col. Vasilios Pappas, USMC, Program Manager, H-1

Thursday, May 16

Special Session 7 (10:15 am – 12:15 pm):

Expanding the Supply Chain

Moderated by Dana Jensen, USAF

- Alan Davis, i5 Services
- Patrick Joyce & Arti Shah, Deloitte Consulting
- Rhonda Staudt, HyPoint
- Andrew Miller, Benchmark Mineral Intelligence

Special Session 8 (1:30 pm – 3:00 pm):

Challenges in Electric VTOL

Moderated by Dave Clark, Aerocar Journal

- Starr Ginn, NASA
- JR Hammond, CAAM
- David Eichstedt, VerdeGo Aero
- Autumn Turner, ES Aero
- Steve Caravella, Siemens

Special Session 9 (3:30 pm – 5:30 pm):

Progress in Development of Electric VTOL

Moderated by Graham Warwick, Executive Editor, AviationWeek

- Joerg Mueller, Airbus UAM
- Erick Corona, Wisk Aero
- Manal Habib, MightyFly
- Robert Scholl, Textron eAviation