AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS
DAYTON-CINCINNATI SECTION

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Wright Brothers Chapter

Dayton Chapter

Vertical Flight Society

SYMPOSIUM GUIDE

The Forty-Seventh Annual

Dayton-Cincinnati Aerospace Sciences Symposium

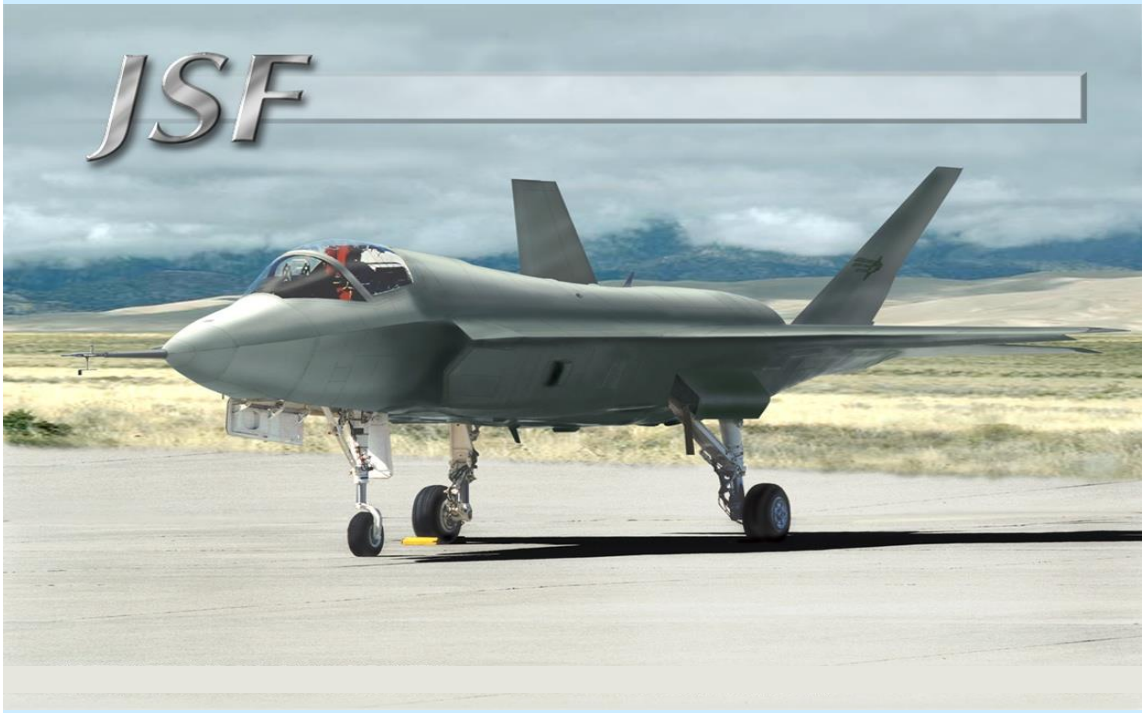

Photo Courtesy of Dr. Bevilaqua

8 March 2022

Sinclair Ponitz Conference Center

https://www.aiaa-daycin.org/DCASS

Greater Ohio Chapter

Dayton Section

Ohio Valley Section

Human Factors and Ergonomics Society

Society for the Advancement of Material and Process

Welcome

to the

47th AIAA Dayton-Cincinnati Aerospace Sciences Symposium (DCASS)

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For forty-seven years the AIAA Dayton-Cincinnati Aerospace Sciences Symposium has provided a unique venue for technical interchange with members of our regional aerospace community. The symposium showcases cutting-edge research within a one-day program that includes technical presentations across multiple areas of aerospace science and technology.

The symposium program includes more than sixty technical presentations in a day-long virtual event. Our invited keynote speaker is Dr. Paul Bevilaqua. Dr. Bevilaqua started his career locally as an Air Force officer at Wright-Patterson AFB, before eventually becoming the Chief Engineer of the Lockheed Martin Skunk Works. Dr. Bevilaqua played a leading role in developing the Joint Strike Fighter, and will be presenting a keynote address discussing the technical and programmatic challenges involved in developing the F-35 JSF.

This year, with the increased availability of vaccines and treatment methods for COVID-19, the organizing team made the decision to return to an in-person format. An in-person symposium offers information exchange and connection opportunities that cannot be replicated. Attendees are respectfully requested to practice social distancing and good hygiene practices such as hand washing and the use of sanitizer to the maximum extent possible, as well as masking for those able to comfortably do so.

The symposium has been organized by a group of dedicated volunteers who team throughout the year to make this meeting a success. This meeting would not be possible without their sustained effort. We thank the local leaders supporting DCASS as general co-chairs, and our co-sponsoring professional societies listed within this program. This meeting is also made possible by our corporate and educational sponsors shown on the back of this program. We thank them for their generous support.

Finally, we encourage all attendees to submit their vote for the art-in-science contest. The best presentations and art-in-science award winners will be recognized at the annual Dayton-Cincinnati Section Awards Program.

We hope you enjoy today's symposium, and we look forward to seeing you again next year!

Matthew Tufts and Zifeng Yang
2022 DCASS Executive Co-Chairs

AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS

AIAA Dayton-Cincinnati Section

DAYTON-CINCINNATI SECTION

2022 DAYTON-CINCINNATI SECTION AWARDS

CALL FOR NOMINATIONS

Recognize the achievements of your colleagues. The local Awards Banquet is fast approaching. Nominations are sought for several local awards. These include:

Outstanding Technical Contribution - Science Award: Presented to a Dayton-Cincinnati AIAA Section member(s) [limit of 2 people] to recognize a significant scientific achievement during the past year.

Outstanding Technical Contribution - Application Award: Presented to a Dayton-Cincinnati AIAA Section member(s) [limit of 2 people] to recognize a significant development or application achievement during the past year.

Outstanding Management Contribution Award: Presented to a Dayton-Cincinnati AIAA Section member(s) [limit of 2 people] for outstanding management contributions made during the past year.

There is no specific format required. Simply complete the attached form and E-mail the information. Award selections will be made by an expert panel of judges.
Submit nominations (by E-mail) by **29 April 2022** to:

Dr. Marc Polanka
Tel: (937) 255-3636 x4714 E-mail: marc.polanka@afit.edu

NOMINATION FORM

(Nomination Package Must be Limited to 2 Pages)

CATEGORY:

Nominee:	**Nominator:**
Affiliation:	**Affiliation:**
Address:	**Address:**
Tel:	**Tel:**
E-mail:	**E-mail:**

Symposium Schedule At-A-Glance

Registration: 7:00 AM – 2:00 PM

Corporate Exhibits: 9:00 AM – 4:00 PM

Art in Science Competition: 9:00 AM–4:00 PM

VOTE ONLINE! To cast your Art-in-Science ballot online, please log into your DCASS account at https://www.aiaa-daycin.org/DCASS/DCASS.php and click on the Art-in-Science Voting button. A list of all entries, including the original submitted image/video and details, will be presented. You'll be able to select your choices for winners and cast your ballot from there.

Please fill out the Survey: www.aiaa-daycin.org/DCASS/feedback.php

First Block 8:20 AM – 10:00 AM

1	Thermal Protection Systems I	Room 116
2	Computational Fluid Dynamics	Room 119
3	Artificial Intelligence and Learning Systems	Room 120
4	Numerical Analysis and Simulation	Room 127
5	Hypersonics and Re-Entry Vehicles	Room 131
6	Fluid Dynamics I	Room 171
7	Detonation Combustion	Room 231
8	Fuels	Room 282

Second Block 10:20 AM – 11:20 AM

9	Thermal Protection Systems II	Room 116
10	Systems Engineering	Room 119
11	Materials and Structures I	Room 120
12	Applied Aerodynamics I	Room 127
13	Air Breathing Propulsion	Room 131
14	Fluid Dynamics II	Room 171
15	Combustion I	Room 231
16	Space Systems	Room 282

Keynote Program in Frederick C. Smith Auditorium (Room 150) 11:40 AM – 12:40 PM

Lunch in Great Hall 12:40 PM – 1:40 PM

Third Block 1:40 PM – 3:00 PM

17	Thermal Protection Systems III	Room 116
18	Flight Dynamics & Controls I	Room 119
19	Materials & Structures II	Room 120
20	Applied Aerodynamics II	Room 127
21	Additive Manufacturing I	Room 131
22	UAS Design & Applications	Room 171
23	Combustion II	Room 231
24	Space Domain Awareness	Room 282

Fourth Block 3:20 PM – 4:40 PM

25	Thermal Protection Systems IV	Room 116
26	Flight Dynamics and Controls II	Room 119
27	Imaging & Diagnostics	Room 120
28	Acoustics	Room 127
29	Additive Manufacturing II	Room 131
	Room Not Used	Room 171
30	Heat Transfer & Thermal Management	Room 231
	Room Not Used	Room 282

The abstracts for the talks presented today may be found on the following website: https://www.aiaa-daycin.org/DCASS/list_abs.php . The Executive Committee encourages the use of this website.

Awards Information: The Dayton-Cincinnati Section of the AIAA is proud to continue its long-standing tradition of recognizing the best work presented at this symposium, as judged by the Session Chairs. This year, awards will be made in the following technical categories:

Category	Sessions	Category	Sessions
Aerospace Enabling Technologies	3, 4, 10, 27	Fluid Dynamics	2, 6, 28, 14
Combustion	7, 15, 23	Thermal Protection Systems	1, 9, 17, 25
Fuels and Heat Transfer	8, 30	Materials Science	11, 19, 21, 29
Atmospheric Vehicles and Propulsion	5, 13, 22	Space	16, 24
Applied Aerodynamics and Controls	12, 18, 20, 26		

Session Chairs will provide scores based on the quality of the abstract, innovation and magnitude of effort, technical contribution, and presentation style. One winner will be selected for each technical category, and the presenters will be invited to the AIAA Annual Awards Banquet (free ticket!) to receive their awards!

For online access to the Program-at-a-glance, please visit: https://www.aiaa-daycin.org/DCASS/glance.php

AIAA Dayton-Cincinnati Section

47th Dayton-Cincinnati Aerospace Sciences Symposium

Time	Room 116	Room 119	Room 120	Room 127	Room 131	Room 171	Room 231	Room 282
	SESSION 1 **Thermal Protection Systems I** Chair: Rydge Mulford *UD*	SESSION 2 **Computational Fluid Dynamics** Chair: Hang "Bill" Yi *WSU*	SESSION 3 **Artificial Intelligence and Learning Systems** Chair: Edwin Forster *AFRL*	SESSION 4 **Numerical Analysis and Simulation** Chair: Donald Rizzetta *AFRL*	SESSION 5 **Hypersonics and Re-Entry Vehicles** Chair: Mauro Noel De Leon *AFIT*	SESSION 6 **Fluid Dynamics I** Chair: Jielong "Jacky" Cai *UD*	SESSION 7 **Detonation Combustion** Chair: Brian Bohan *AFIT*	SESSION 8 **Fuels** Chair: Matthew R. Gazella *AFIT*
8:20 AM	*47DCASS-024* Estimating Effective Radiative Properties and In-Depth Radiative Heating of Porous Ablators *Ayan Banerjee - UKY* *Savio J Poovathingal - UKY*	*47DCASS-025* Computational and Analytical Studies on Liquid Drop Impact: Effects of Gravity and Fluid Properties *Murat Dinc - MU*	*47DCASS-070* Fuzzy Logic Based Approach for Autonomous Vehicle Decision Making at Roundabouts *Daniel Heitmeyer - UC* *Dr. Kelly Cohen - UC*	*47DCASS-001* Gust Simulations and Optimizations for an Efficient Supersonic Air Vehicle *Markus Rumpfkeil - UD*	*47DCASS-075* Multi-fidelity Analysis of Predictive Capability for Hypersonic Conceptual Design *James Wnek - WSU*	*47DCASS-059* Experimental and Numerical Studies on the Projective Dye Visualization Velocimetry in a Squared Vertical Tube *Mark Johnson - WSU* *Zifeng Yang - WSU*	*47DCASS-053* Evaluation of a Tapered Rotating Detonation Engine *Nathan Snow - AFIT* *Marc D. Polanka and* *Frederick R. Schauer -* *AFIT*	*47DCASS-069* Predicting fully supercritical mixing behavior at engine relevant conditions *Taber Wanstall - UD*
8:40 AM	*47DCASS-042* Validation of Fibergen against FiberForm and Charred Pica *Luis Chacon - UKY*	*47DCASS-087* CFD Investigation of Bleed in an Inward Turning Inlet *Jon Liu - MU* *Edgar Caraballo - MU* *Mark Hagenmaier - AFRL* *Jose Camberos - WSU*	*47DCASS-006* Adaptive Learning of Emulator Embedded Neural Networks for Multi-Fidelity Conceptual Design Studies *Atticus Beachy - WSU* *Harok Bae - WSU* *C. Corey Fischer - AFIT* *Ramana Grandhi - AFIT*	*47DCASS-003* Direct Molecular Simulation of High-Speed Flow over a Cylinder *Ashley Verhoff - AFRL* *Maninder Grover - UDRI* *Paolo Valentini - UDRI* *Nicholas Bisek - AFRL*	*47DCASS-041* Determination of the presence of liquid layers on ice particles within the shock layer of a reentry vehicle *Tyler Stoffel - UKY* *Tyler D. Stoffel - UKY* *Savio J. Poovathingal - UKY*	*47DCASS-095* A Research Facility for the Characterization of Internal Flows Through Transition Ducts with Favorable and Adverse Pressure Gradients *Vincent Onoja - UC* *Daniel Cuppoletti - UC*	*47DCASS-054* Improvements to the Radial Rotating Detonation Engine *John T. Ursino - AFIT* *Marc D. Polanka and* *Tony Yi - AFIT* *Kavi Muraleetharan - AFRL*	*47DCASS-078* Liquid Column Breakup and Surface Instability Development of Liquid Jets in Subsonic Crossflows *Vincent Shaw - UC* *Pierce Elliott - UC* *Matt Boller - UC* *Ephraim Gutmark - UC*
9:00 AM	*47DCASS-036* Estimating In-Depth Radiative Heating and Charring Profiles for Porous Ablators *Ahmed Yassin - UKY* *Ayan Banerjee - UKY* *Savio J. Poovathingal - UKY*	*47DCASS-062* The Study of Internal Carotid Artery Sidewall Aneurysms Using an Experimentally Validated Computational Fluid Dynamics Model *Hang "Bill" Yi - WSU* *Mark Johnson - WSU* *Luke Bramlage - WSU* *Bryan Ludwig - WSU* *Zifeng Yang - WSU*	*47DCASS-104* Learning Decentralized Controllers for Multi Agent Systems with Machine Learning *Eshaan Khanapuri - UC* *Rajnikant Sharma - UC*	*47DCASS-091* Gas Dynamic Simulations of Flow through a Converging-Diverging Nozzle Using Quantum Computing *Marek Brodke - UC* *Prashant Khare - UC*	*47DCASS-046* Kentucky Re-entry Universal Payload System (KRUPS): Overview of capsule re-entry experiment *John Schmidt - UKY* *Matthew P. Ruffner - UKY* *J. Tyler Nichols - UKY* *William T. Smith - UKY* *Alexandre Martin - UKY*	*47DCASS-088* Design and Characterization of a Vortical Gust Generator in The University of Dayton Water Tunnel *Andrew Killian - UD* *Sidaard Gunasekaran - UD* *Michael Mongin - AFRL* *Alberto Medina - AFRL*	*47DCASS-066* Thermoacoustic Suppression in a Rotating Detonation Combustor using Perforated Liner *Tyler Pritschau - UC* *Jorge Betancourt - UC* *Alec Gaetano - UC* *Rachel Wiggins - UC* *Ephraim Gutmark - UC*	*47DCASS-089* Predicting Fuel Lower Heating Value From Ultraviolet Absorbance *Steven Ivec - UD* *Josh Heyne - UD*
9:20 AM	*47DCASS-098* Mesoscale structural analysis of inhomogeneities in ablative materials using statistical distribution of properties derived at the microscale *Sean Mcdaniel - UKY* *Mujan Seif - UKY* *Rui Fu - UKY* *Matthew Beck - UKY* *Alexandre Martin - UKY*	*47DCASS-086* A Python based program for post-processing of CFD data *Dilip Kalagotla - UC* *Harpreet Chhabra - UC* *Paul Orkwis - UC*	*47DCASS-113* Reinforcement Learning based search of a moving ground target by a UAV aided by ground sensors *Srikanth Elkoori Ghantala Karnam - UC* *Rajnikant Sharma - UC*	*47DCASS-004* Numerical Simulation of Transition Delay on a Wing Section by Dynamic Surface Deformation *Donald Rizzetta - AFRL* *Miguel Visbal - AFRL*	*47DCASS-027* Validation of modified SPARTA program for direct simulation Monte Carlo of non-equilibrium gases *Ethan Huff - UKY* *Dr. Savio Poovathingal - UKY*	*47DCASS-103* Wake Effects on Agricultural Spray Using Drones *Ian Tierney - UD* *Sid Gunasekaran - UD*	*47DCASS-047* Characterization of Rotating Detonation Engine with Air Film Cooled Outer Body *Scott Chriss - UD* *Kevin Cho - ISSI* *John Hoke - ISSI* *Adam Holley - AFRL* *Matthew Fotia - AFRL*	*47DCASS-082* Spray Structure Detection of the heated Liquid Jet in High-Temperature Crossflows *Pierce Elliott - UC* *Vincent Shaw - UC* *Matt Boller - UC* *Ephraim Gutmark - UC*
9:40 AM	*47DCASS-023* Solid State Generating Devices Incorporated into Thermal Protection Systems for Passive Power Generation on Air-Breathing Hypersonic Vehicles *Calvin Callahan - UD* *Meredith Wall - UD* *Rydge Mulford - UD* *Jared Miles - AFRL*	*47DCASS-109* Computational Fluid Dynamic Analysis of Ramps and Injectors for Use as Shock Generators *Ryan O'rorke - UC* *Daniel Cuppoletti - UC*	*47DCASS-090* Coupling Genetic Algorithm with an Artificial Neural Network for Optimization of a S-CO2 Compressor. *Saugat Ghimire - UC* *Mark G. Turner - UC*	*47DCASS-002* Aeroelastic Analysis and Optimization using FUNtoFEM of an Efficient Supersonic Air Vehicle *Markus Rumpfkeil - UD*	*47DCASS-009* Effect of surface cooling on boundary layer transition at Mach 6 *Mathew Major - AFIT*		*47DCASS-115* The Effects of Wall Treatment on Rotating Detonation Combustor Performance *Jorge Betancourt - UC* *Tyler Pritschau - UC* *Alec Gaetano - UC* *Rachel Wiggins - UC* *Ephraim Gutmark - UC*	*47DCASS-112* Optimization of Sustainable Aviation Fuel Composition for Improved Energy Consumption of Jet Engines *Jack Hoog - UD* *Joshua Heyne - UD* *Lily Behnke - UD* *Randall Boehm - UD*
10:00 AM	Break							

Abbreviations:

AC = AFIT Contractor
AFIT = Air Force Institute of Technology
AFRL = Air Force Research Laboratory
CSM = Colorado School of Mines
DST = Dependable System Technologies, LLC
ETP = Etteplan
FLLC = Folderol, LLC
ISSI = Innovative Scientific Solutions Inc.
LMSW = Lockheed Martin Skunk Works
MSSRC = Multidisciplinary Software Systems Research Corporation
MU = Miami University
NARC = NASA Ames Research Center
NMSFC = NASA Marshall Space Flight Center
NRC = National Research Center
OAI = Ohio Aerospace Institute
OHHS = Oak Hills High School
OSU = The Ohio State University
PU = Purdue University
SDU = Swedish Defence University
UAH = University of Alabama in Huntsville
UC = University of Cincinnati
UD = University of Dayton
UDRI = University of Dayton Research Institute
UES = UES, Inc.
UKY = University of Kentucky
WSU = Wright State University

	Room 116	Room 119	Room 120	Room 127	Room 131	Room 171	Room 231	Room 282
	SESSION 9 **Thermal Protection Systems II** Chair: John F. Maddox *UKY*	SESSION 10 **Systems Engineering** Chair: Hang "Bill" Yi *WSU*	SESSION 11 **Materials and Structures I** Chair: John Brewer *AFIT*	SESSION 12 **Applied Aerodynamics I** Chair: Nicholas Bisek *AFRL*	SESSION 13 **Air Breathing Propulsion** Chair: Markus Rumpfkeil *UD*	SESSION 14 **Fluid Dynamics II** Chair: Zifeng Yang *WSU*	SESSION 15 **Combustion I** Chair: Marc D. Polanka *AFIT*	SESSION 15 **Space Systems** Chair: Andrew Keys *AFIT*
Time								
10:20 AM	*47DCASS-020* Prediction of Effective Permeability for Porous Materials based on Surrogate Modelling *Vijay Mohan Ramu - UKY* *Savio J. Poovathingal - UKY*	*47DCASS-028* Category Theory for Engineers & Scientists *Jose Camberos - AFRL* *Larry Lambe - MSSRC* *Michael Watson - NMSFC* *Stephen Johnson - DST* *Bryan Mesmer and David Perner - UAH*	*47DCASS-092* Exploration of Data Clustering within a Novel Multi-Scale Topology Optimization Framework *Kevin Lawson - UD* *Brent Bielefeldt - NRC* *Robert Lowe - UD* *Joshua Deaton - AFRL* *Richard Beblo - AFRL*	*47DCASS-121* Lighter Than Air Vehicle *Anthony Palazotto - AFIT*	*47DCASS-073* Area Modeling of Computational Inlet Swirl Distortion *Marcus Acton - WSU* *Mitch Wolff - WSU* *Michael List - AFRL*	*47DCASS-063* Toward Reduced-Order Models of Hypersonic Transition *Matthew Tufts - AFRL* *Timothy Leger - OAI* *Nicholas Bisek - AFRL*	*47DCASS-108* Understanding The Operating Mechanism of Valved-Pulsejet Engines *Mohamad Ghulam - UC* *Shyam Muralidharan, Vijay Anand, Ephraim J. Gutmark - UC* *Erik Prisell - SDU* *Owe Lyrsell - ETP*	*47DCASS-055* Design of an Electro-Thermal Nanosatellite Propulsion System *James Founds - AFIT* *Carl H. Hartsfield - AFIT*
10:40 AM	*47DCASS-067* Numerical simulations of hypersonic carbon oxidation models *Ares Barrios-lobelle - UKY* *Raghava S. C. Davuluri - UKY* *Rui Fu - UKY* *Savio J. Poovathingal - UKY* *Alexandre Martin - UKY*	*47DCASS-021* Mathematical and Graphical Representation of Systems Integration in DEJI Systems Model *Adedeji Badiru - AFIT* *Nils Wagenknecht - AFIT* *Andreas Mertens - AFIT*	*47DCASS-043* A Novel Nonlinear Transient Thermo-Mechanical Finite Element Approach to Frictional Wear *Sam Naboulsi - AC* *Anthony Palazotto - AFIT*	*47DCASS-085* Wing to Wing Interactions for Distributed Lift Applications *Nevin Jestus - UD* *Sidaard Gunasekaran - UD*	*47DCASS-110* Numerical Exploration of Unstart in a High Speed Duct *Erika Nosal - OSU* *Nicholas J. Bisek - AFRL* *Datta V. Gaitonde - OSU*	*47DCASS-093* Experiments in a High-Speed Flow *Ross Kellet - AFIT*	*47DCASS-083* The Influence of the Fuel-Oxidizer Mixture on Geometric Detonation Amplification *Benjamin Millard - UC* *Daniel Cuppoletti - UC*	*47DCASS-064* Study of Hopping Mechanics for Different Terrain Conditions for Hopping on a Low-Gravity Surface *Andrew Barth - UC* *Samuel King - UC* *Ou Ma - UC* *Janet Dong - UC*
11:00 AM	*47DCASS-032* Estimating permeability of porous carbon composites using a convolutional neural network *Brendan Soto - UKY* *Savio J. Poovathingal - UKY*	*47DCASS-068* Systems Engineering Applications to Health and Usage Monitoring Capabilities for the Life Cycle Management of Small Unmanned Aerial Vehicles *Sharon Macumber - UC* *Jon Ander Martin - UC* *Justin Ouwerkerk - UC* *Bryan Kowalczyk - UC* *Kelly Cohen - UC*	*47DCASS-050* Measurements of permeability of fiberform carbon inside a vacuum system. *Sam Potter - UKY* *Yejajul Hakim - UKY* *John R. O'Nan - UKY* *Michael Renfro - UKY* *Alexandre Martin - UKY*	*47DCASS-071* The Effect of Blade Count on the Performance of a Fanwing Used as a High-Lift Device *John McSwiggin - OHHS* *Rebecca Gilligan - UC* *Bryan Kowalczyk - UC* *Justin Ouwerkerk - UC* *Austin Wessels - UC*	*47DCASS-011* Exergy-Based Analysis and Optimization of a Scramjet Engine *Francis Centlivre - WSU* *Mitch Wolff - WSU* *Mark Hagenmaier - AFRL* *Timothy Eymann - AFRL* *Jose Camberos - AFRL*	*47DCASS-101* Preliminary Subsonic Wind Tunnel Studies of a 1/36th Scaled Snowplow Truck *Murat Dinc - MU*	*47DCASS-052* Design and Application of a Cavity-Stabilized Compact Combustor *Nathan Clark -AFIT* *Marc D. Polanka and* *Brian T. Bohan - AFIT*	*47DCASS-014* Deep Q-learning-based Coordinated Multi-Robot Systems for Planetary Exploration Mission Support: Deploy and Position Large or Massive Unevenly-shaped *Kaushik Palani - UC* *Donghoon Kim - UC*
11:20 AM	Break							
11:40 AM	KEYNOTE PROGRAM (see next page for details)							
12:40 PM	Lunch Break							

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ISSI = Innovative Scientific Solutions Inc.
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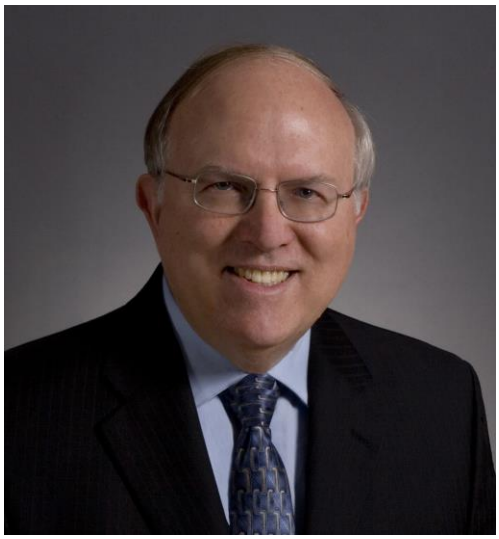
MSSRC = Multidisciplinary Software Systems Research Corporation
MU = Miami University
NARC = NASA Ames Research Center
NMSFC = NASA Marshall Space Flight Center
NRC = National Research Center
OAI = Ohio Aerospace Institute
OHHS = Oak Hills High School
OSU = The Ohio State University
PU = Purdue University
SDU = Swedish Defence University
UAH = University of Alabama in Huntsville
UC = University of Cincinnati
UD = University of Dayton
UDRI = University of Dayton Research Institute
UES = UES, Inc.
UKY = University of Kentucky
WSU = Wright State University

47th AIAA Dayton-Cincinnati Aerospace Sciences Symposium

Please join us at 11:40 for the Keynote Program:

Welcome and Announcements:
DR. MATTHEW W. TUFTS
2022 DCASS Executive Chair

Keynote Address:
Inventing the Joint Strike Fighter
DR. PAUL BEVILAQUA
Technical/Research Director, Lockheed Martin Aeronautics Company (Retired)



Dr. Bevilaqua has spent much of his career developing V/STOL aircraft, at Wright Patterson AFB, at Rockwell International, and then at Lockheed Martin. He led the Skunk Works' X-35 development team that received the Collier trophy, which each year recognizes "the greatest achievement in aeronautics or astronautics in America" for the demonstration of his innovative lift/cruise propulsion system. He was elected to the National Academy of Engineering, is an AIAA Fellow, and was recently awarded the Guggenheim Medal for the conception and demonstration of technologies enabling the production of the F-35 family of stealthy, supersonic Strike Fighters.

Dr. Paul Bevilaqua joined Lockheed Martin as the Chief Aeronautical Scientist and became Chief Engineer of the Skunk Works, where he played a leading role in creating the F-35 Joint Strike Fighter. He invented the dual cycle propulsion system that made it possible to build a stealthy supersonic VSTOL Strike Fighter, and suggested that conventional and Naval variants of this aircraft could be developed to create a common, affordable aircraft for all three services. He subsequently led the engineering team that demonstrated the feasibility of building this aircraft.
Prior to joining Lockheed Martin, he was Manager of Advanced Programs at Rockwell International's Navy aircraft plant, where he led the design of VSTOL interceptor and transport aircraft. He began his career as an Air Force officer at Wright Patterson AFB, where he developed an ejector lift system for an Air Force Search and Rescue Aircraft.

He is a Member of the National Academy of Engineering and a Fellow of the American Institute of Aeronautics and Astronautics. He was voted Engineer of the Year by the readers of Design News Magazine. He was also awarded the Guggenheim Medal, a USAF Scientific Achievement Award, AIAA and SAE Aircraft Design Awards, AIAA and VFS VSTOL Awards, and Lockheed Martin AeroStar and Nova Awards.

He earned a BSc in Aerospace Engineering from the University of Notre Dame and a PhD in Aeronautics and Astronautics from Purdue University. He was also awarded an Honorary Doctorate by the University of Cranfield in Britain.

AIAA Dayton-Cincinnati Section

47th Dayton-Cincinnati Aerospace Sciences Symposium

Time	Room 116	Room 119	Room 120	Room 127	Room 131	Room 171	Room 231	Room 282
	SESSION 17 **Thermal Protection Systems III** Chair: John F. Maddox *UKY*	SESSION 18 **Flight Dynamics & Controls I** Chair: Mark Reeder *AFIT*	SESSION 19 **Materials & Structures II** Chair: Robert Lowe *UD*	SESSION 20 **Applied Aerodynamics II** Chair: Rama Gorla *AFIT*	SESSION 21 **Additive Manufacturing I** Chair: Anthony Palazotton *AFIT*	SESSION 22 **UAS Design & Applications** Chair: Jose Camberos *AFRL*	SESSION 23 **Combustion II** Chair: Mohammad Gulam *UC*	SESSION 24 **Space Domain Awareness** Chair: Carl Hartsfield *AFIT*
1:40 PM	*47DCASS-107* Numerical reconstruction of spalled particle trajectories in an arc-jet environment: Accounting for non-sphericity and back-tracking *Raghava S. C. Davuluri - UKY* *Sean C. C. Bailey - UKY* *Kaveh A. Tagavi - UKY* *Alexandre Martin - UKY*	*47DCASS-039* Genetic Fuzzy Control for Flight Stabilization in a UAV Payload System on Detachment from Team in Constrained Indoor Environments *Akshay Elangovan - UC* *Catharine McGhan - UC*	*47DCASS-111* Investigating the Mechanics of a Rapidly Self-healing Photo-curable Elastomer *Joseph Beckett - UD* *Braeden Windham, Allyson Cox, Timothy Osborn - UDRI* *Carl Thrasher - UES* *Laura Sowards - AFRL* *Robert Lowe - UD*	*47DCASS-012* Propeller Ground and Ceiling Effect in Forward Flight *Jielong "Jacky" Cai - UD* *Sidaard Gunasekaran - UD* *Michael OL - FLLC*	*47DCASS-029* Strengthening of additively manufactured tungsten by use of hydrogen in argon shielding gas *Cayla Eckley - AFIT* *Ryan A. Kemnitz - AFIT* *Brianna M. Sexton - AFIT* *Alex R. LeSieur - AFIT*	*47DCASS-065* All-Terrain Aerial Robotic Interface (ATARI) Concept as a Collaborative Platform for UAVs *Rebecca Gilligan - UC* *Dr. Kelly Cohen - UC* *Bryan Kowalczyk - UC* *Justin Ouwerkerk - UC* *Austin Wessels - UC*	*47DCASS-096* Non-linear Flame Oscillations in a Multi-swirl Combustor *Yuvi Nanda - UC* *Aditya Saurabh -* *Lipika Kabiraj -* *Rodrigo Villalva Gomez - UC* *Ephraim Gutmark - UC*	*47DCASS-015* A Proposed Space Domain Awareness Taxonomy for Earth-Moon System Space Operations *Adam Wilmer - AFIT* *Robert A. Bettinger - AFIT*
2:00 PM	*47DCASS-016* Arc-Jet Experiments for Spalled Particle Capture *Kristen Price - UKY* *Raghava S.C. Davuluri - UKY* *Alexandre Martin - UKY* *Sean C.C. Bailey - UKY*	*47DCASS-076* Fuzzy Inference System-based 3D Resolution Algorithm for Collision Avoidance of Fixed-wing UAVs *Shyam Rauniyar - UC* *Donghoon Kim - UC*	*47DCASS-008* Comparison of Low-cost Ceramic Manufacturing Methods of a Ceramic Turbine Rotor for Small-Scale Engines *Bryan Leicht - AFIT* *Brian Bohan, Ryan Kemnitz, Fred Fred Schauer - AFIT* *Lisa Rueschhoff, Mark Fernelius, William Costakis - AFRL* *Benjamin Lam - AFRL*	*47DCASS-034* Towards an Efficient Method for F16 Limit Cycle Oscillation Prediction *Donald Kunz - AFIT* *Daniel Kariv - AFIT* *Michael Iovnovich - AFIT*	*47DCASS-030* High-Temperature Three-Point Bending of Additively Manufactured Refractory Metal Alloys *Brianna Sexton - AFIT* *Ryan Kemnitz - AFIT* *Cayla Eckley - AFIT*	*47DCASS-094* Design Algorithm for Optimized Electric Quadcopter Build *Alexandra Mangel - OSU* *Matthew McCrink - OSU*	*47DCASS-128* Flame Characterization using Progress Variable and Mixture Fraction in a Laminar Premixed Jet in Vitiated Coflow *Michael Mckinney - UKY* *Gabriella Marie - UKY* *Michael W. Renfro - UKY*	*47DCASS-048* Optimization of Spacecraft Formation Geometry for Increased Range Observability *Wilson Flores - AFIT* *Costantinos Zagaris - AFIT*
2:20 PM	*47DCASS-019* Validating Arc-jet Condition Targets Using Inverse 1D Material Response Models *Page Askins - UKY* *Alexandre Martin - UKY* *Ben Libben - NARC* *Joseph Williams - NARC* *Grant Palmer - NARC*	*47DCASS-077* Control-Affine Formulation and Optimization of Dynamic Soaring Flight *Sameer Pokhrel - UC* *Sameh A. Eisa - UC*	*47DCASS-051* Measurements of tortuosity of fiberform carbon inside a vacuum system. *Sam Potter - UKY* *Yejajul Hakim - UKY* *John R. O'Nan - UKY* *Michael Renfro - UKY*	*47DCASS-120* Increasing the Lift of Delta Wings by the Prevention of Vortex Bursting *Paul Bevilaqua - LMSW* *Chandler Moy - PU*	*47DCASS-010* Additive-Manufacturing and Casting for a P400 Composite Compressor *Mauro Noel De Leon - AFIT* *Brian Bohan - AFIT* *Frederick Schauer - AFIT* *John Brewer - AFIT* *Mark Fernelius - AFRL*	*47DCASS-099* Development of an Unmanned Aerial System for the 2022 AUVSI Student Unmanned Aerial Systems Competition *Rebecca Gilligan - UC* *Daniel Heitmeyer - UC* *Isaac Poplin - UC* *Heath Palmer - UC* *Dr. Kelly Cohen - UC*	*47DCASS-0129* Characterizing Laminar Flames in Co-Flow using OH and CH2O Planar-Laser Induced Florescence *Gabriella Marie - UKY* *Michael McKinney, and* *Michael W. Renfro - UKY*	*47DCASS-005* Tracking Dim Cislunar Objects in L2 NRHO and HALO Orbits with Geo/Heo-based Optical Sensors *Darren Thornton - AFIT* *Bryan Little - AFIT* *Bryan Steward - AFIT*
2:40 PM	*47DCASS-038* Gradient base volume-averaging of thin-layers for TPS modeling *Hilmi Berk Gur - UKY* *Christen E Setters - UKY* *Rui Fu - UKY* *Alexandre Martin - UKY*	*47DCASS-084* Extremum Seeking Control With Kalman Filter in Formation Flight *Shivam Bajpai - UC* *Sameh A. Eisa - UC*		*47DCASS-061* Flow properties of Supersonic Double CD Square Jet Nozzle *Arshad Mohammed - UC* *Aatresh Karnam - UC* *Mohammad Saleem - UC* *Ephraim Gutmark - UC*	*47DCASS-033* Simulation of Residual Stress Generation in Additive Manufacturing of Complex Lattice Geometries *Katie Bruggeman - WSU* *Anthony Palazotto - AFIT* *Nathan Klingbeil - WSU* *Mitch Wolff - WSU* *Joy Gockel - CSM*	*47DCASS-057* Automatic Scanning of a Large Aircraft using a UAV and Reinforcement Learning Technique *Yufeng Sun - UC* *Ou Ma - UC*		*47DCASS-117* Experimental Assessment of Synthetic Aperture Silhouette Imaging for Space Domain Awareness *Lester L. Tuck - AFIT* *Andrew S. Keys - AFIT* *Peter N. McMahon-Crabtree - AFRL*
3:00 PM	Break							

Abbreviations:

AC = AFIT Contractor
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UES = UES, Inc.

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WSU = Wright State University

AIAA Dayton-Cincinnati Section

47th Dayton-Cincinnati Aerospace Sciences Symposium

Time	Room 116	Room 119	Room 120	Room 127	Room 131	Room 171	Room 231	Room 282
	SESSION 25 **Thermal Protection Systems IV** Chair: Raghava S. C. Davuluri *UKY*	SESSION 26 **Flight Dynamics and Controls II** Chair: Costantinos Zagaris *AFIT*	SESSION 27 **Imaging & Diagnostics** Chair: Brian Bohan *AFIT*	SESSION 28 **Acoustics** Chair: Arshad Mohammed *UC*	SESSION 29 **Additive Manufacturing II** Chair: Nathan Klingbeil *WSU*		SESSION 30 **Heat Transfer & Thermal Management** Chair: James Rutledge *AFIT*	
3:20 PM	*47DCASS-122* Effect of Induction Heating on Thermocouple Measurements *Layton Gibson - UKY* *Christopher T. Barrow - UKY* *John F. Maddox - UKY*	*47DCASS-022* Underactuated Attitude Control of a CubeSat Using Cold Gas Thrusters and Nonlinear Control Methods *Adam Cottrell - AFIT* *Robert Bettinger - AFIT*	*47DCASS-116* Tomographic Imaging of Rotating Detonations in a Hollow Combustor *Alec Gaetano - UC* *Tyler Pritschau - UC* *Jorge Betancourt - UC* *Rachel Wiggins - UC* *Ephraim Gutmark - UC*	*47DCASS-105* Exploration of Broadband Noise Analysis for Two Rotors in Hover *Peter N Sorensen - UC* *Daniel R Cuppoletti - UC*	*47DCASS-037* Effect of build geometry and Build Parameters on Microstructure, Fatigue Life, and Tensile Properties of Additively Manufactured Inconel 718. *Anna Dunn - WSU* *Rachel Evens - WSU* *Joy Gockel - CSM* *Dan Young - WSU*		*47DCASS-013* Considerations for Scaling Convection in Overall Effectiveness Experiments *Carol Bryant - AFIT* *James Rutledge - AFIT*	
3:40 PM	*47DCASS-044* An Orthotropic Thermal Conductivity Measurement in Flexible Fibrous Insulation Materials *James Senig - UKY* *John F. Maddox - UKY*	*47DCASS-007* Dynamics and Control of a Robotic Servicing CubeSat *Charles Carr - AFIT* *Costantinos Zagaris - AFIT*	*47DCASS-026* Determining Heat Shield Effective Permeability Through Microtomographic Imaging *Cameron Brewer - UKY* *Savio J. Poovathingal - UKY*	*47DCASS-114* Acoustic Properties of Single and Twin Rectangular Jets with Integrated Internal Fluidic Injection Strategies *Kaurab Gautam - UC* *Mohammad Saleem - UC* *Ephraim Gutmark - UC*	*47DCASS-045* Testing and Characterization of Additive and Traditionally Manufactured Nickel-Based Superalloys in a Combustion Materials Test Facility *Matthew R. Gazella - AFIT* *Marc D. Polanka - AFIT* *Ryan A. Kemnitz - AFIT* *Cayla C. Eckley - AFIT* *Brianna M. Sexton - AFIT*		*47DCASS-035* Dehumidification and Anti-Icing Evaluation: Fundamental Research of Open Air Cycle Technologies *Danielle Masse - AFRL* *Mitch Wolff - WSU*	
4:00 PM	*47DCASS-056* Isolation of Heat Transfer Modes in Strain-Induced Fibrous Insulation *Christopher T. Barrow - UKY* *John F. Maddox - UKY* *Sergiy Markutsya - UKY*	*47DCASS-072* Comparing Run Time Assurance Approaches for Safe Spacecraft Docking *Kyle Dunlap - UC* *Kelly Cohen - UC* *Kerianne Hobbs - AFRL*	*47DCASS-106* Vacuum ultraviolet spectroscopy's contribution to the prescreening of fuels *Aaron Spieles - UD* *Joshua Heyne - UD*	*47DCASS-097* Investigation into Aeroacoustic Rotor Scaling Effects for eVTOL Applications *Matthew Walker - UC* *Daniel Cuppoletti - UC*	*47DCASS-031* Vibration Bending Fatigue of Additively Manufactured Nickel Alloy 718 with As-Built Surface Roughness *Rachel Evans - WSU* *Nathan Klingbeil - WSU* *Joy Gockel - CSM*		*47DCASS-060* Uncertainty Quantification for Heat Transfer and Structural Analysis of a Turbine Blade *Rama Gorla - AFIT*	
4:20 PM		*47DCASS-118* Observability based Control in Cooperative Agents to aid Relative Pose Estimation *Rohith Boyinine - UC* *Rajnikant Sharma - UC* *Kevin Brink - AFRL*					*47DCASS-100* Development of a Dual Mode Rankine Cycle for High-Performance Aircraft *Jacob Spark - WSU* *Mitch Wolff - WSU* *Levi Elston - AFRL* *Jared Mccoppin - UDRI*	
4:30 PM	Adjourn							

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