AIAA

NORTHWEST FLORIDA SECTION

Congratulations to Dr. Scott Morton!

Dr. Morton was selected to receive the **2021 American Institute of Aeronautics and Astronautics Aerodynamics Award**! The Aerodynamics Award, approved by the Board of Directors in 1983, is presented for meritorious achievement in the field of applied aerodynamics, recognizing notable contributions in the development, application, and evaluation of aerodynamic concepts and methods. This annual award is generally presented at the AIAA Aviation and Aeronautics Forum and Exposition.

Dr. Morton received the award:
"For a career devoted to extending the application of CFD to challenging unsteady aerodynamic phenomena, such as transonic flutter, complex vortical flowfields, and maneuvering flight."

Spring 2021 Newsletter

Contributors:
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Micah Reese and Ryan Sherrill, editors

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LOCAL ACTIVITY

Distinguished Lecture Series

On February 18th, the section hosted Dr. Robert "Bob" Winn for a distinguished lecture on "The Anatomy of an In-Flight Breakup". Organized by Program chair Eugen Toma, Dr. Winn discussed the in-flight breakup of a small Piper aircraft and the three possible causes: fatigue, flutter, and overload. Each of these failure modes were discussed using video footage from airshows or flight testing to demonstrate how they affect an aircraft. A thorough investigation of the aircraft wreckage and radar trajectory analysis, along with some fluid dynamic simulation, was used to determine the exact cause of the in-flight breakup. There was also a lively question period where Dr. Winn answered clarifying questions from the audience. Overall, the talk was well-received with 97 participants including AIAA local members, local professional societies, and other individuals from both Eglin AFB and Wright-Patterson AFB.

E-week

On February 25 the section celebrated Engineering Week with a series of professional talks organized by Technical Chair Kevin Brink and co-hosted by the Doolittle Institute. The morning started with an introduction by AFRL Chief Scientist Dr. David Lambert who discussed the importance of professional organizations and technical interchange.

Second, the section then hosted Mr. Steve Lee, the Aerospace Cybersecurity Manager for AIAA, for an cybersecurity roundtable with Dr. Ryan Sherrill, Northwest Florida section chair, and Mr. Mike Van Dyke from the Doolittle Institute. Steve started off by telling a story of how a power plant was infected by malware due to someone plugging their vaping pen into a computer to charge. His long term goal is that cybersecurity is introduced into collegiate engineering curriculums and becomes as common to an engineer's thinking as safety is today. When asked what we can do to stay safe, Steve suggested keeping work and personal devices separate, instead of having one device for both, as this lowers the risk of accidental security mistakes and keeps your family's data safe.

Third, Ms. Melanie Anderson, a Ph.D. student from the University of Washington presented "The Smellicopter: A Bio-hybrid Odor Guided Autonomous Palm-sized Air Vehicle". Melanie described how moth antennae are extremely sensitive chemical sensors that can outperform current man-made sensors. The Smellicopter is a palm-sized drone which can autonomously follow an odor plume to its source using a moth antennae and has potential uses for sensing gas leaks or locating trapped survivors. While presenting her results, Melanie mentioned that one of the biggest challenges is the short testing window before the moth antennae begins to degrade. Melanie is a 2018 recipient of the National Defense Science and Engineering Graduate Fellowship and hopes to graduate later this year.

Following lunch, Dr. Mitzi Dennis presented "A Novel Computational Method for Optimal Guidance and Control". A recent graduate of the University of Florida, Mitzi's work focused on the trajectory optimization of a low-altitude skid-to-turn vehicle. She described computational optimal guidance and control using adaptive Gaussian quadrature collocation and sparse nonlinear programming. One of the main advancements of her work was a mesh truncation and remapping procedure that retained only the mesh points associated with the unexpired horizon. The results showed the computational method for optimal guidance and control has the potential to improve performance over traditional methods when solving an optimal control problem in real time.

Next, the section hosted Dr. Scott A. Morton who presented "A Vision for High Fidelity Multi-Disciplinary Simulation Built Surrogates Influencing the Design and Assessment of Military Aircraft". Dr. Morton won this year's AIAA Aerodynamics Award "For a career devoted to extending the application of CFD to challenging unsteady aerodynamic phenomena, such as transonic flutter, complex vortical flowfields, and maneuvering flight." His presentation focused on Physics Based Digital Engineering, starting with an explanation of digital

surrogates and how they impact the engineering lifecycle, and then continued with explanations of physics based analytics, data driven analytics, and digital surrogates. Next, Dr. Morton walked through an example of applying Physics Based Digital Engineering to a combat air vehicle. This example showed how different levels of simulation can be useful and how analytics can eliminate poor design choices as information and fidelity increase. He concluded by discussing how Physics Based Digital Engineering Is the inevitable progress of technology and how machine learning and digital surrogates will deliver decision support at the speed of relevance.

Finally, Dr. Robert Murphey presented on “Scalable Autonomous Teams in 2040”. Dr. Murphey foresees future heterogeneous teams being able to learn about a new environment, adapt, and accomplish different types of complex tasks. There are four key aspects which will enable this vision, which include: distance free scaling, massive machine networks, hierarchy of time, and learning at scale. After discussing each of these key aspects, four technologies which will enable this 2040 vision were examined. These include communication determinism, peer flexibility, nonclassical information structures, and cognitive and behavioral flexibility. The talk concluded with a technology maturation roadmap, describing each of the key aspects at 2020, 2030, and finally 2040.

These talks covered a wide range of topics and discussed both current research areas and upcoming technologies that will affect the aerospace discipline both nationally and here in northwest Florida. We look forward to next year when E-week can be both an in-person and online event. Thank you to Kevin Brink and our speakers, Dr. David Lambert, Mr. Steve Lee, Ms. Melanie Anderson, Dr. Mitzi Dennis, Dr. Scott A. Morton and Dr. Robert Murphey.

Soda Straw Rockets with the Cub Scouts

Dr. John Fay met with the kids from Cub Scout Pack 52 to design-build-fly air-powered rockets made from soda straws.

UPCOMING NATIONAL AIAA EVENTS

AIAA Design/Build/Fly
15 APRIL - 18 APRIL 2021
Virtual

2021 Integrated Communications Navigation and Surveillance Conference (ICNS)
20 APRIL - 22 APRIL 2021
Herndon, Virginia

2021 AIAA Aviation and Aeronautics Forum and Exposition (2021 AIAA AVIATION Forum)
2 AUGUST - 6 AUGUST 2021
Virtual

2021 AIAA Propulsion and Energy Forum and Exposition (AIAA Propulsion and Energy Forum)
9 AUGUST - 11 AUGUST 2021
Virtual

AIAA/IEEE Electric Aircraft Technologies Symposium (EATS)
11 AUGUST - 13 AUGUST 2021
Virtual

AIAA DEFENSE Forum
20 SEPTEMBER - 22 SEPTEMBER 2021
Laurel, Maryland

See more at the AIAA Events page

OTHER UPCOMING EVENTS

This is a new section of the newsletter! We recognize that there are many relevant events outside of AIAA. If you know of any and want to spread the word, let us know: nwfl.aiaa@gmail.com

TeCMEN Industry Day
14 APRIL 2021
Fort Walton Beach, Florida

ABOUT THE SECTION

The Northwest Florida Section of the American Institute of Aeronautics and Astronautics, Inc. (AIAA NWFL) is home to 289 members (as of May 2019): 124 professionals, 141 educator associates, and 24 students. The section spans 24 counties across northern Florida from Pensacola to north of Jacksonville. These counties are: Escambia, Santa Rosa, Okaloosa, Walton, Holmes, Washington, Bay, Jackson, Calhoun, Gulf, Gadsden, Liberty, Franklin, Leon, Wakulla, Jefferson, Madison, Taylor, Hamilton, Suwanee, Lafayette, Columbia, Baker, and Nassau. Most of the aerospace-related activities in the AIAA NWFL section are at military installations in the western panhandle.

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