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### Chair Chat

*St. Louis Section Chair- Jim Guglielmo*

Welcome to the 2019-2020 year of the AIAA St. Louis Section! It is an honor to be your current Chair, and I look forward to leading the section in the coming year.

I want to first thank Tom Rehmeier, the previous St. Louis Section Chair, for his leadership this past year. Under his direction, and due to the hard work and long hours by the members of the Council, the AIAA St. Louis Section won first place for the "Large Section" in six out of the nine 2018-2019 national award categories, and second in two others. We received first place for: 1) Outstanding Section; 2) Outstanding Activity; 3) Career and Professional Development; 4) Young Professional; 5) Membership; and 6) Section-Student Branch Partnership. We received second place for STEM K-12 and Communication. This is truly a significant accomplishment, and it is a testament to the dedication of the AIAA St. Louis Council.

In the upcoming year, we will continue the monthly dinner meetings and technical specialist presentations, as well as look for opportunities to partner with other organizations. Additional focus will be on our STEM K-12 activities, led by Jackie Blumer, as well as planning at least one event on the weekend that is more family-oriented, with activities for both young and older children.

A list of upcoming activities and dates is included in this newsletter, along with contact information for the members of the Council.

One of my goals for this year is to expand the diversity of our programs to attract current members and their families who have not actively participated in any recent events. If you have any questions, recommendations, or suggestions for events, please email me at [james.j.guglielmo@boeing.com](mailto:james.j.guglielmo@boeing.com) or call 314-452-1271. And if you are interested in either volunteering on the Council or at an event, we welcome your help.

Thanks!

*Jim Guglielmo*



*Jim receiving the "Outstanding Section Award" at the Regional Leadership Conference*

## Aerospace Link of the Month



<https://www.defensenews.com/naval/2019/09/19/the-us-navys-new-autonomous-refueling-drone-takes-historic-first-flight/>

*The MQ-25 Stingray first flight at Mid-America Airport, September 19<sup>th</sup>, 2019.  
(Boeing)*

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## History in Aviation: September

*Historian - Colin Thiele*



**13 September 1935** – Howard Hughes, a millionaire film producer and amateur air racer, broke the world land speed record in his custom-built Hughes Racer aircraft. The aircraft topped out at 352.322 mph.



**1 September 1953** – A Boeing B-47 “Stratojet” is used to refuel another B-47, marking the first time jet-to-jet midair refueling is completed.

**18 September 1947** – The United States Air Force is officially formed as an independent service within the unified US Armed Forces.

**17 September 1959** – The first powered flight of the North American X-15 rocket aircraft is completed at Edwards Air Force Base.

## STEM Event: Zoom into Summer

*Nic Moffitt & Jackie Blumer*

On June 29, the first annual *Zoom into Summer*, Aviation Scholarship Picnic and Family Fun event, was hosted at the Greater Saint Louis Air & Space Museum at the Downtown Airport in Cahokia, Illinois. The event was co-hosted with the museum, 99s Women Pilots of St. Louis, EAA Young Eagles, and AIAA.

The 99s Women Pilots provided a picnic lunch. The EAA and Greater St Louis Flight Instructor Association had several planes available to give kids a chance to ride in an airplane. The Tuskegee Airmen, Incorporated hosted a booth to tell students about their program for youth who want to learn to fly. The program helps pay for ground school and, if the student keeps their grades up and out of trouble, offers a flight school camp for high school students. Southwestern Illinois College was also advertising their aviation program. And the museum was open to everyone all day.

The St Louis Section hosted a STEM booth, which offered two hands-on crafts for kids. The kids could build a paper stomp rocket, load their rocket on a launcher, and stomp on the plastic bottle to launch their rocket high into the air. The kids could also build a rubber band launched rocket out of foam. The kids really enjoyed both crafts and many stayed to make both rockets or came back after their flight. Scholarship applications and information about Educator Associate memberships was also distributed from the AIAA booth.

Thank you to everyone who helped host this event. The kids really enjoyed it!



*Airplane Rides for Kids*



*Future Pilot in Training...*





## STEM Event: *Apollo 50<sup>th</sup> Anniversary* at Science Center

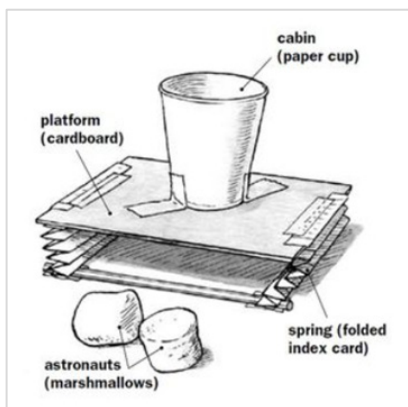
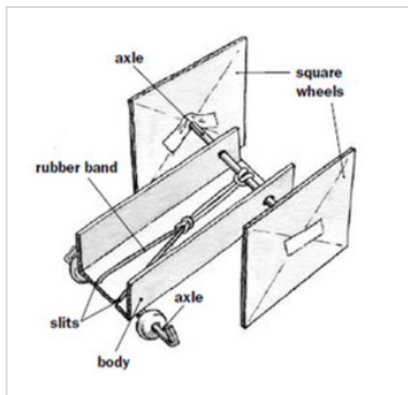
*Nic Moffitt & Jackie Blumer*

On July 20, the St Louis Section hosted two tables at the St. Louis Science Center's *Apollo 50<sup>th</sup> Anniversary* celebration. Twelve of our members and their families helped students build one of two hands-on crafts. One table offered students the opportunity to build a lunar rover to keep two marshmallow "astronauts" safe during their drop onto the surface of the moon. The other table helped students build a rubber band powered, lunar rover. For the rover activity, the kids were given many different components and simple guidance, but their innovation was allowed to shine in their design. The rover allowed the kids to determine the shape and size of their wheels, which affects how well the rover grips the ground, rolls smoothly, and distance traveled. Some rovers were made with circular, octagonal, and even heart-shaped wheels. The kids were allowed to explore their design by building, testing, and correcting how they saw fit.

Thank you to everyone who helped host these two tables, especially the two student members from Missouri Science & Technology, who drove in from Rolla. The kids really enjoyed the hands-on time and the time and patience that you put into their innovation.



*Kids Making Lunar Rover at Apollo 50th Anniversary Event at St. Louis Science Center*



*Lunar Rover and Lander (Credit: NASA JPL)*



*Kids Making Lunar Rover at Apollo 50th Anniversary Event at St. Louis Science Center*

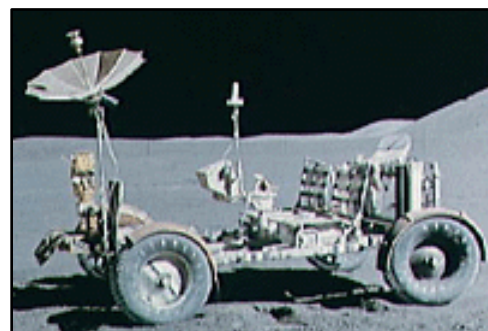
## STEM Corner: How to Make Your Own Lunar Rover

### Overview

This activity allows students to design, build, and test their own designs of a self-propelled vehicle. The students get to select the size and shape of their wheels, which directly impacts the performance their vehicle for different situations: furthest distance, highest speed, smoothest ride, and gripping the ground (smooth or rough surface).

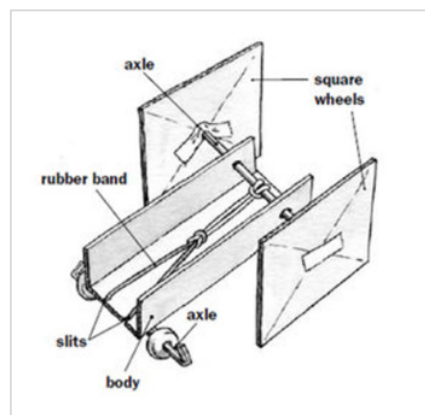
### Background

Apollo 15, 16, and 17 all included a Lunar Roving Vehicle (LRV) in the lower portion of the Lunar Module (LM). The LRV used electric propulsion to allow the two astronauts to travel up to 7.5 km from the LM. The LRV was stored (folded) under the LM and deployed with some interaction from astronauts.



### Materials (per rover)

- Cardboard or foam board for body (6" square)
- 2x cardboard or foam board for wheels (5" square)
- 1 sharpened round pencil
- 2 rubber bands
- 2 round candies (hard, white, mint ones with a hole precut in the middle)
- 1 plastic drinking straw
- Ruler, tape, and scissors



### Procedure

1. Fold the body cardboard into thirds. Mark locations of front and rear axles.
2. Mark the center of the wheels by drawing diagonals between the corners, punch a hole in the center, and trim the wheels to any desired shape.
3. Put a pencil through front of the body. Add two wheels on pencil. Secure with tape.
4. Tape straw under back of body. Add candy wheels. Bend straw to secure wheels.
5. Tie rubber bands together. Loop one end around pencil and back through itself. Cut slits in cardboard at back of body. Secure other end of rubber band through slits.
6. Wind up wheels to tighten the rubber bands. Sit on floor and release.
7. Test and evaluate: Distance, speed, or smoothness of ride. Have the students test their designs, side by side or with different wheel geometries.

*Reference:* This page was adapted from the demonstration on the NASA JPL website<sup>1</sup>. See that website for more information, videos, and other ideas for the classroom.

<sup>1</sup> <https://www.jpl.nasa.gov/edu/teach/activity/roving-on-the-moon/>

## Technical Specialist Meeting: September

*Technical Specialist Chair- John Schaefer*

The 2019-2020 Technical Specialist meeting series kicked off on Tuesday, September 10. Boeing Aerodynamicist Nathan Hemming presented his work entitled “*A Methodology for Rapid Hypersonic Flow Predictions via Surrogate Modeling with Machine Learning and Deep Learning.*” Using Neural Networks, Random Forests, and Gradient Boosting, Nathan was able to accurately predict hypersonic boundary layer behavior without the need for additional computational fluid dynamics simulations beyond the training set. Approximately 20 people attended the presentation, with a particularly strong turnout from the SLU student chapter.

Next month we will be joined by Washington University Professor Dr. Ramesh Agarwal. Dr. Agarwal will be presenting the topic: “*Active Wingtip Vortex Cancellation in a Propeller - Driven UAV with Distributed Electric Propulsion.*” An event flyer will be distributed soon.



*John Schaefer & Nathan Hemming*

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## September Dinner Meeting: New Members & Aerospace Trivia Night

*Nic Moffitt & Bob Dowgwillo*

The first dinner meeting of the year was held on September 19 with a New Members theme. Instead of the usual panel of AIAA members, we hosted 51 people for an Aviation & Space Trivia Night. About half of those in attendance were family of members, local students, and other non-members. Two students attended from SIUE, where there is currently not a student branch. Several students and professionals signed up for memberships after the event. The Jimmy John's sandwiches appeared to be a hit. The evening proved to be a great start to our 2019-2020 program year.

The night began with Thomas Rehmeier (outgoing Section Chair) officially passing the gavel to Jim Guglielmo (incoming Section Chair). Jim then presented the awards bestowed by AIAA National on the Section for the previous year. Under Thomas' leadership, your St. Louis Section captured first or second place in *all but one category* for a Large Section:

Place	Award	Nominator (Chair)
First	Outstanding Section Award	Thomas Rehmeier
First	Outstanding Activity Award	Thomas Rehmeier
First	Career and Professional Development Award	Bob Dowgwillo
Second	Communications Award	Andrea Martinez
First	Membership Award	Nic Moffitt
Second	STEM K-12 Award	Jackie Blumer
First	Section-Student Branch Partnership Award	Charlie Svoboda
First	Young Professional Activity Award	Stephen Clark

Rachel Dowdy, AIAA Coordinator for Student and Regional Communities, was in town to visit local student branches and spoke about activities on the National level. Nic Moffitt gave a brief overview of the perks of being an AIAA member and recent activities hosted by the St Louis Section.

The Trivia Night was organized by Bob Dowgwillo (Programs Chair) and Tom McAtee (recently retired Boeing engineer). Bob and Tom took turns reading questions from ten categories, such as “Name that Plane”, Designations, Film, Music, and St Louis Aviation History.

First place, by a wide margin, was the team of Mark Hartford, Phil Frohne, Greg Groves, John Dunn, Rick Morgan, and Richard Dann. The team graciously used their winning to offset the cost of students attending the event. Major lesson learned: have a diverse team!

Various drawings were made for door prizes throughout the night. Ashley Purkey of Boeing Research & Technology won the raffle for the Lego Lunar Lander.

Thank you to everyone who attended, and congratulations to everyone who won!

### **Are YOU a Total St. Louis Aviation Buff?**

Here are the questions from the Aviation & Space Trivia Contest, from the category “St. Louis, True or False”. All 8 questions are either True or False. See what you can answer. No Googling! The answers will be published in **next month’s newsletter**, so that you can check your proficiency:

1. The tower on top of the 22-floor Continental Building located in Grand Center was intended to moor airships until the Hindenburg Disaster dashed those plans.
2. Newly renovated Boeing Aviation Fields in Forest Park, home to 4 baseball and 4 softball diamonds, was once a real airfield.
3. There once was an aircraft factory in the University City Loop.
4. Lambert airport once was home to both an Air National Guard Base AND a Naval Air Station
5. St Louis hosted the famous Floyd Bennett Balloon Races three times, more than any other city in the world.
6. The F-15 Eagle made its first flight on July 27, 1972 from Lambert Airport.
7. During the 1937 St. Louis Air Races, Louise Thaden broke the women’s speed record held by Amelia Earhart.
8. In 1965, a twin engine airplane was flown through the Gateway Arch.

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### **Upcoming Events**

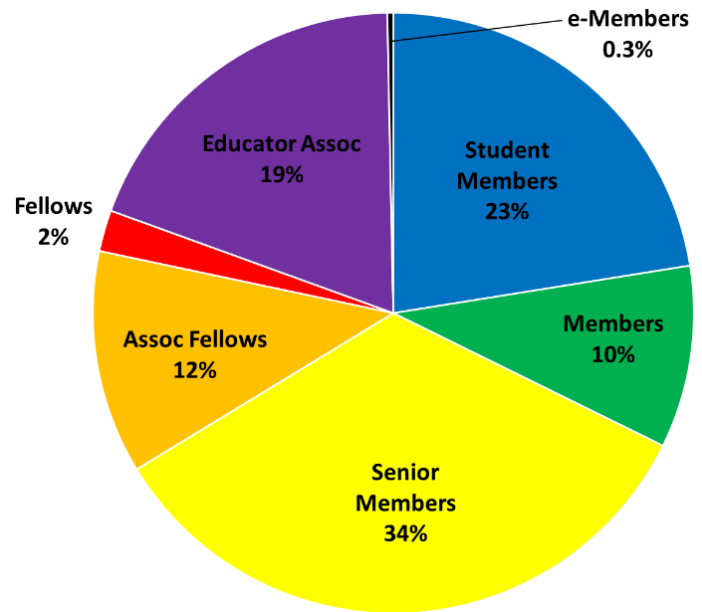
- October 17<sup>th</sup> – Dinner Meeting (Dr. Jim Horkovich, “*Changing the Game; Informing and Influencing Public Policy & Emerging Technology*”)
- October 29<sup>th</sup> – Technical Specialist Meeting (Dr. Ramesh Agarwal, “*Active Wingtip Vortex Cancellation in a Propeller-Driven UAV with Distributed Electric Propulsion*”)
- November 14<sup>th</sup> – Dinner Meeting (Dan Adamo, “*Forty Years on the Bleeding Edge of Technology from an Aerospace Engineer’s Perspective*”)
- November 19<sup>th</sup> – Technical Specialist Meeting (Mathew Rueger, “*Wind Tunnel Testing*”)
- December 10<sup>th</sup> – Technical Specialist Meeting (Mark Kammeyer, Boeing Polysonic Wind Tunnel Tour)
- December (Date TBD) – Dinner Meeting (Member Appreciation; Toys for Tots Drive)

## Membership Report

*Nic Moffitt – Membership Chair*

The Section membership is current 632 members.  
The distribution breaks down as shown in the table below and pie chart:

Type	Number
Professional	369
Student	142
Educator Associate	121



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### Making a Change?

Are you graduating and moving? Planning to retire soon? Making a career move? If you are leaving the St. Louis Section area, please update your AIAA profile, so you will continue to receive accurate AIAA correspondence.

Go to "My AIAA" <http://www.aiaa.org/myAIAA> and, upon logging in, go to "My Account" and select "Edit Contact Info."

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### AIAA St. Louis Section Website

Please see the AIAA St. Louis Section website for more information about upcoming events, announcements, and discussions: <https://engage.aiaa.org/stlouis/home>

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## AIAA St. Louis Section Council

Office	Officeholder	Telephone	Email
<b>Chair</b>	Jim Guglielmo	314-452-1271	<a href="mailto:james.j.guglielmo@boeing.com">james.j.guglielmo@boeing.com</a>
<b>Vice Chair</b>	Mark Kammeyer	314-234-9497	<a href="mailto:mark.e.kammeyer@boeing.com">mark.e.kammeyer@boeing.com</a>
<b>Secretary</b>	Ben Reuter	314-542-2490	<a href="mailto:benjamin.j.reuter@boeing.com">benjamin.j.reuter@boeing.com</a>
<b>Treasurer</b>	Alec Herzog	314-545-5219	<a href="mailto:alec.n.herzog@boeing.com">alec.n.herzog@boeing.com</a>
<b>Advisor</b>	Bob Dowgwillo	314-234-1013	<a href="mailto:robert.m.dowgwillo@boeing.com">robert.m.dowgwillo@boeing.com</a>
<b>Advisor</b>	Srikanth Gururajan	314-977-8355	<a href="mailto:srikanth.gururajan@slu.edu">srikanth.gururajan@slu.edu</a>
<b>Advisor</b>	Dave Peters	314-935-4337	<a href="mailto:dap@wustl.edu">dap@wustl.edu</a>
<b>Advisor</b>	Chris Tavares	314-777-4663	<a href="mailto:christopher.m.tavares@boeing.com">christopher.m.tavares@boeing.com</a>
<b>Region V Rep.</b>	Thomas Rehmeier	314-232-2986	<a href="mailto:thomas.r.rehmeier@boeing.com">thomas.r.rehmeier@boeing.com</a>

Committee	Chair	Telephone	Email
<b>Career Workforce Development</b>	Paul Bent	314-712-0660	<a href="mailto:Paul.Bent@boeing.com">Paul.Bent@boeing.com</a>
<b>Education &amp; College Outreach</b>	Charles Svoboda	314-545-2363	<a href="mailto:charles.svoboda@boeing.com">charles.svoboda@boeing.com</a>
<b>History</b>	Colin Thiele	----	<a href="mailto:Colin.thiele@slu.edu">Colin.thiele@slu.edu</a>
<b>Honors &amp; Awards</b>	Chelsea Fuller	314-232-9349	<a href="mailto:chelsea.m.fuller@boeing.com">chelsea.m.fuller@boeing.com</a>
<b>Membership</b>	Nic Moffitt	314-234-3864	<a href="mailto:nicholas.j.moffitt@boeing.com">nicholas.j.moffitt@boeing.com</a>
<b>Newsletter</b>	Abby Sevier	314-563-6542	<a href="mailto:abigail.e.sevier@boeing.com">abigail.e.sevier@boeing.com</a>
<b>Programs – Dinner Meetings</b>	Bob Dowgwillo	314-234-1013	<a href="mailto:robert.m.dowgwillo@boeing.com">robert.m.dowgwillo@boeing.com</a>
<b>Programs – Tech Specialist</b>	John Schaefer	314-232-9331	<a href="mailto:John.a.schaefer3@boeing.com">John.a.schaefer3@boeing.com</a>
<b>Public Policy</b>	Frank Youkhana	314-234-4811	<a href="mailto:frank.w.youkhana@boeing.com">frank.w.youkhana@boeing.com</a>
<b>Publicity</b>	Andrea Martinez	314-232-3062	<a href="mailto:andrea.martinez3@boeing.com">andrea.martinez3@boeing.com</a>
<b>Retirees</b>	Ray Cosner	----	<a href="mailto:ray.cosner@outlook.com">ray.cosner@outlook.com</a>
<b>Service Projects</b>	Brad Sexton	314-232-7926	<a href="mailto:bradley.w.sexton@boeing.com">bradley.w.sexton@boeing.com</a>
<b>STEM</b>	Jackie Blumer	----	<a href="mailto:jblumer@bccu2.org">jblumer@bccu2.org</a>
<b>Strategic Planning</b>	Larry Brase	314-234-4907	<a href="mailto:lawrence.o.brase-jr@boeing.com">lawrence.o.brase-jr@boeing.com</a>
<b>Webmaster</b>	Thomas Rehmeier	314-232-2986	<a href="mailto:thomas.r.rehmeier@boeing.com">thomas.r.rehmeier@boeing.com</a>
<b>Young Professionals</b>	Stephen Clark	314-545-9509	<a href="mailto:stephen.f.clark3@boeing.com">stephen.f.clark3@boeing.com</a>

*If you are interested in joining one of the committees, please contact the AIAA St. Louis Section Chair, Jim Guglielmo, or the committee chairperson.*



American Institute of Aeronautics and Astronautics  
St. Louis Section

Thursday, October 17, 2019

Syberg's  
2430 Old Dorsett Road  
Maryland Heights, MO 63043

### Special Public Policy Event

## “Changing the Game; Informing and Influencing Public Policy & Emerging Technology”

By Dr. Jim Horkovich

AIAA Fellow; DEPS Fellow; Founder, AIAA Directed Energy Systems Program Committee  
President Emeritus, Directed Energy Professional Society (DEPS)



Engineers need to understand the relationship between technological advances and public policy formulation. This talk will present an overview of how public technology policy is formulated starting at the President and Congress of the United States and the associated flow down through government agencies into funded efforts and programs. Examples of infamous past policy predictions are discussed to show that even the best minds don't always have a perfect “crystal ball” and that new technology ideas have to be presented and sold to decision makers in such a manner that constructive plans come forward for the benefit of society. AIAA's efforts in the public policy arena, including Congressional Visits Day, is highlighted. This interdisciplinary talk addresses the role that technology plays in changing the social geopolitical landscape, using the pursuit of High Power Laser and Directed Energy technology as the key example from “Star Wars” to the present.

**Dr. Jim Horkovich** is currently a Senior Principal Scientist for Directed Energy Programs for AEGIS Technologies, assuming that position in August of 2018. He brings 50 years of experience, with more than 40 of those in directed energy systems, to that role.

He served as the Director for Directed Energy Programs for Schafer Corporation from 2015 through 2018, when Schafer was sold to Belcan Corporation. He was previously engaged as a Raytheon engineering fellow and Chief Technical Architect for High Power Laser Programs in the Raytheon Missile Systems Advanced Missiles and Unmanned Systems product line from 2004 through 2014. While at Raytheon he also served as Raytheon's corporate technical area director for multifunction electro-optical systems.

Schedule	Menu	Cost
5:00 pm – Social time w/ <u>Cash Bar</u>	<u>Cash Bar</u>	<b>\$20 per person</b>
5:45 pm – Buffet Dinner	Buffet Dinner:	<b>\$15 for Educator</b>
6:45 pm – Presentation	Top Round of Beef	<b>Associates</b>
8:00 pm – Adjourn	Chicken Marsala	<b>\$10 for Students</b>
	Salad, Mashed	
	Potatoes, Vegetables	
	Cake	
<u><b>Reservation Deadline:</b></u> <b>12:00 pm on Wednesday, 16 October 2019</b> <b>Reservations MUST be made by email to</b> <a href="mailto:stl.aiaa@gmail.com"><u>stl.aiaa@gmail.com</u></a> <b>Please include all names and indicate if you are a student or Educator Associate</b>		<b>Membership is <u>NOT</u></b> <b>required to attend this</b> <b>event. All are Welcome.</b>
		



American Institute of Aeronautics and Astronautics

**St. Louis Section**

**Tuesday, October 29, 2019**

**Preston M. Green Hall**

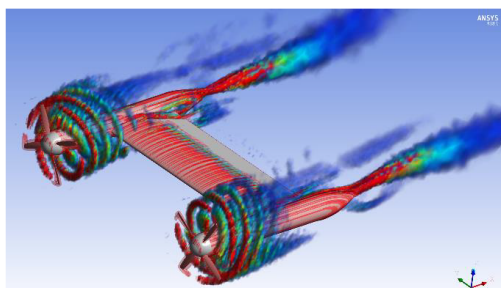
Rodin Auditorium (Basement)

1 Brookings Dr.

St. Louis, MO 63130

## **Active Wingtip Vortex Cancellation in a Propeller-Driven UAV with Distributed Electric Propulsion**

Presented by Dr. Ramesh Agarwal, Professor at Washington University in St. Louis



As battery and electric motor technology continues to advance rapidly, propeller-driven electric UAV/aircraft are likely to become a significant part of the aviation market in the near future. One proposed design configuration for electric UAV involves using large, wing-tip mounted propellers to actively cancel wingtip vortices; a method called active wingtip vortex cancellation (AWVC). By reclaiming part of the kinetic energy that would otherwise

be lost to tip vortex formation, drag is decreased. In addition, the tip-mounted propeller causes the span-wise lift distribution to remain more uniform at the wingtips, increasing the lift. In this talk, CFD simulations of this configuration will be presented, which accurately compare to wind tunnel data. The results show that large increases in lift and net thrust are possible solely through the phenomenon of AWVC. This talk will also describe CFD for more exotic UAV and aircraft AWVC configurations, as well as distributed propulsion with more propellers mounted on the wing.

Professor Ramesh K. Agarwal is the William Palm Professor of Engineering in the department of Mechanical Engineering and Materials Science at Washington University in St. Louis. Over a period of forty five years, Professor Agarwal has worked in many areas of Computational Science and Engineering. He is the author or coauthor of over 600 journal and conference publications.

### **Schedule**

5:00 – 5:30 Sign-in / social

5:30 – 6:30 Presentation

6:30 – 7:00 Additional questions or  
follow-on conversations

### **Menu**

Sandwiches and  
light refreshments

### **Ticket Price**

Free

**Reservation by 10 AM Friday, October 25**

Send reservation by email\*: [stlaiaa@gmail.com](mailto:stlaiaa@gmail.com)

Contact [John Schaefer](#) for questions

\* In email, please include name and # tickets

