

Seminar / Presentation

Thursday, April 13, 2023

10:30am – 12:00pm

Gold Auditorium, Donald P. Shiley BioScience Center

“Current and Future Trends in Electrification of Air Transportation and the Role of Power Electronics”



Speaker: Dr. Kaushik Rajashekara, University of Houston, Texas

Abstract: The aerospace industry is facing challenges similar to the automotive industry in terms of improving fuel economy, and reducing the emissions and cost. The air transportation accounts for about 3% of global CO₂ emissions. The European Commission formulated reduction targets in the “Flight Path 2050”: 75% CO₂ reduction per passenger kilometer relative to the capabilities of typical new aircraft in 2000, as well as 90% NO_x and 65% perceived noise reduction. Similarly,

two US government agencies, the International Air Transport Association (IATA), and the International Civil Aviation Organization (ICAO) have set a goal of 2% annual fuel efficiency improvement through 2050 and carbon neutral growth from 2020 onwards. In order to reduce the emissions from the aircraft, the industry has seen an increasing research and technology advancements in more electric aircraft (MEA), electric, hybrid, and fuel cell based electric aircrafts. In this presentation, a brief introduction to emissions due to aircraft, more electric aircraft technologies, fuel cell based APU, distributed and hybrid electric architectures are presented. The strategies and advantages of using hydrogen for propulsion are examined, both directly as a fuel to the jet engines, and as a fuel to the fuel cell system to power the aircraft propulsion motors. The research and development of on-going work by a few companies on eVTOL and flying cars are briefly presented. In addition, this presentation discusses how the power electronics is enabling the technologies for advancement of the aircraft electrification.

Biography: Dr. Kaushik Rajashekara received his BE, ME, and Ph.D. from the Indian Institute of Science. He joined the Delphi division of General Motors Corporation in Indianapolis, IN, USA, as a staff project engineer in 1989. In Delphi and General Motors, he held various lead technical and managerial positions and was a Technical Fellow and the Chief Scientist for developing electric machines, controllers, and power electronics systems for electric, hybrid, and fuel cell vehicle systems. In 2006, he joined Rolls-Royce Corporation as a Chief Technologist for More Electric Architectures and power conversion/control technologies for Electric, More Electric, and Hybrid Electric Aircrafts. In August 2012, he joined as a Distinguished Professor of Engineering at the University of Texas at Dallas. Since September 2016, he has been a Distinguished Professor of Engineering at the University of Houston. He is a member of the US National Academy of Engineering in 2012, Foreign member of Chinese and Indian National Academies of Engineering. He is a recipient of the 2022 Global Energy Prize and 2021 IEEE Medal on Environmental and Safety Technologies and several other awards. He has published over 250 papers in international journals and conferences, has 37 US and 15 foreign patents, has written one book, and contributed individual chapters to 8 books. His research interests are in the area of power/energy conversion, Transportation Electrification, Renewable Energy and Grid integration.

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