

ECE 590 I

POWER & ENERGY SYSTEMS SEMINAR

Monday, October 11, 2021, 3:00 – 3:50 p.m., ECEB 4070

Zoom Meeting ID: 826 3892 4416

Password: seminar_21

A Spoke-Supported Superconducting Rotor for Aircraft Propulsion

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Abstract: Superconducting machines typically employ air-core designs that operate at very low temperatures. In these machines, the transfer of the torque from the active machine region to the driving shaft is made through the so-called torque tubes. However, the high thermal conductivity of the torque tubes introduces ambient heat into the cryogenic area and therefore requires a bulky cooling mechanism to maintain the cryogenic temperature. This presentation discusses the torque generation of a superconducting machine and a spoke torque transfer system that drastically reduces the heat flow in order to maintain the cryogenic temperature with the aid of a lightweight cryocooler. In this way, the superconducting motor becomes more suitable for aerospace applications.

Challenges in DER Deployment in Remote Electrification

Abhiroop Chattopadhyay

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Abstract: Despite the continuing growth in the fraction of the global energy used in the form of electricity, about 750 million people in the world – a disproportionate number of whom live in rural communities – lack access to electricity supply. Distributed energy resource (DER) systems based on solar photovoltaic and wind energy resources provide a technology platform that has the potential to sustainably address this lack of access. Unfortunately, the full potential of these systems has often not been realized. We discuss the various challenges encountered in the deployment of DER systems to electrify remote rural regions outside the footprint of the utility grids. These challenges arise from the inability to benefit from economies of scale and are also related to location-based contexts of the communities that these systems are designed to serve. We provide some insights from a case study of DER used for the electrification in the Navajo Nation. This case study serves to illustrate why effective technology solutions accompanied by long-term policy initiatives explicitly formulated for the context of place and people are required to meet electrification goals in rural, under-served communities.