MECHANICAL & MATERIAL COLLOQUIUM

Dynamic Data Driven Simulation Modeling for Resilient Microgrid Systems

by Dr. Nurcin Celik (University of Miami)

Energy security and resilience are critical to our daily activities, yet the current electricity systems are vulnerable and fragile against natural or human-made hazards and disasters as well as other abnormalities in the system. Motivated by these challenges, this project investigates a new dynamic data driven monitoring and control framework for smart energy systems with a focus on the critical infrastructures of microgrids and their connection to the main power grid as it is becoming more vital to realize economic security and reliability. However, real-time monitoring and inferencing in a large-scale system such as a power system under limited computational resources is very challenging due to the excessive number of parameters and massive data loads involved. New and effective methodologies that are capable of dealing with massive, highly complex, and rapid moving data are needed to make useful discoveries and achieve punctual control over these networks. Addressing this need, we focused our research efforts on data driven knowledge discovery by real-time inferencing. To this end, the essentials of the developed decision making framework include 1) new and advanced optimization models and algorithms for operation and control including a comprehensive optimization model and a decomposition algorithm for the operation of off-grid AC microgrids, 2) multi-scale adaptive simulation models, and 3) instrumentation methods for decision making in a smart grid network including a demand response model.

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Dr. NURCIN CELIK, Ph.D., is a Professor and Associate Dean for Research in the College of Engineering at the University of Miami (UM) with secondary appointments in Miami Herber Business School (Business Technology) and School of Arts and Sciences (Computer Science). She received her M.S. and Ph.D. degrees in Systems and Industrial Engineering from the University of Arizona with magna cum laude. Sponsored by AFOSR, Department of Defense, DOE, industry partners, foundations, and the City of Coral Gables, she has worked on the development of integrated modeling and decision-making methodologies

for large-scale, complex, and dynamic systems with a focus on smart grids. Dr. Celik received the Presidential Early Career Award for Scientists and Engineers from the White House in 2017. She also received the UM Provost's Award for Scholarly Activity 2011, 2015, 2019 & 2023, 2018 IISE CIS Best Paper Award, 2013 AFOSR Young Investigator Research Award, and 2011 WSC Best Paper Award amongst others. She has served in the editorial board of academic journals and conference organizations.

Place:

Virtually

Time:

2:00-3:15PM

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For questions, comments and suggestions, contact Colloquium Organizers Dr. Saja AL Rifai (salrifai@fiu.edu) or Dr. Jiuhua Chen (chenj@fiu.edu)