PSERC Power Systems Engineering Research Center

PSERC WEBINAR

Physics-based Data-Driven Approaches for Monitoring and Mitigating Voltage Instability

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A key challenge for the successful operation of the power grid is to ensure system stability. Recent economic and regulatory shifts have led to the retirement of fossil fuel-based generation and the installation of renewable resources, both in transmission and distribution systems. The increasing penetration of renewables has made the dynamics more complex and has led to increased interaction between transmission & distribution systems. Thus, conventional offline analysis needs to be augmented with online solutions to ensure stability by exploiting the flexibility of controllable loads and smart inverters of renewable devices.

This presentation will focus on methods that merge physics with data to monitor and mitigate voltage instability while exploiting demand side control and renewables' reactive support capability. I will outline approaches to ensure quick voltage recovery after a grid disturbance by leveraging the physical phenomenon underlying a delayed voltage recovery. Applications to both transmission and distribution systems will be presented that demonstrate the utility of the proposed approach. The key takeaway from the talk is that merging physics into data-driven models provides inductive biases that increases generalizability of models to unseen scenarios.

MARCH 8, 2023 | **1:00-2:00 P.M. ET**

LINK TO WEBINAR

(10:00-11:00 A.M. PT)

Dr. Amarsagar Reddy Ramapuram Matavalam is an assistant professor at Arizona State University. He completed his bachelor's and master's from the Indian Institute of Technology-Madras in 2011 and completed his Ph.D. in electrical engineering from Iowa State University (ISU) in 2019. He has industrial experience in GE Global Research Center India and GE Grid Solutions Redmond. His research aims to analyze and address instabilities in the emerging power grid to enable increased renewable penetration by leveraging tools from dynamical systems and machine learning. His research interests are in power system dynamics & control, data-driven analysis of power systems, the interaction of transmission & distribution systems, and reinforcement learning for power grid operations. His research has received multiple awards, including the Research Excellence Award at ISU. He also led the second-placed team in the international L2RPN-2019 competition on reinforcement learning for power grid operation conducted by RTE, the French electric transmission grid operator.