PSERC Power Systems Engineering Research Center

PSERC WEBINAR

Advances in Grid-Forming Technology

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This presentation will report stablished advances in grid-forming (GFM) technology and will discuss about two critical barriers toward the integration of inverter-based resources (IBRs). One barrier is the variability of the primary energy resources such as wind and solar as well as the limitation of battery energy storage to power grid-forming (GFM) IBRs for relatively long periods of time. The other pertains to the ability of GFM IBRs interconnected to infinite capacity grids to regain synchronism after either symmetrical or asymmetrical short circuit faults have been cleared. To address the first barrier, this talk will introduce an advanced GFM IBR powered by geologic hydrogen as well as technical challenges that arise if considering such primary energy resource. To address the second barrier, it is proposed an advanced GFM stabilizer to enhance the stability of IBRs using the classical speed droop law. The latter is inspired from the classical power system stabilizer for synchronous machinery. These advances are critical toward the resilient and reliable integration of IBRs into modern power grids.

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LINK TO WEBINAR

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

Hugo earned the degree of Ingeniero en electrónica, automatización y control from Universidad de las Fuerzas Armadas - ESPE, Sangolquí, Ecuador, in 2008, the M.S. degree in electrical engineering from Iowa State University (ISU), Ames, IA, USA, in 2011, and the Ph.D. degree in electrical and computer engineering from Purdue University, West Lafayette, IN, USA, in 2016.

Hugo is an Associate Professor in the Department of Electrical and Computer Engineering at ISU and serves as an Associate Editor for the IEEE Transactions on Energy Conversion. His research interests lie at the intersection of renewable energy conversion, transportation electrification, autonomy and control, power system dynamics and protections, power restoration processes, and electromagnetic transient simulations.

Hugo was the recipient of the Fulbright scholarship from 2009 to 2011, the Best paper award by the IEEE Transactions on Energy Conversion for 2013–2014, the IEEE Power & Energy Society Prize paper award for 2015, and the National Science Foundation CAREER award in 2024.