



## PSERC WEBINAR

# Advances to the Blackstart and Fault Ride-Through Capability of Inverter-Based Resources

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Present inverter-based resources (IBRs) cannot blackstart nor restore electric grids because they use phase-locked loops which operation depend on externally generated voltages, e.g., by synchronous machines. This is a critical resilience problem of worldwide significance because future power grids with ultra-high penetration of present IBRs might not be able to recover from blackouts. Even if IBRs could blackstart, they must: (i) withstand the energization of motor, unbalanced, and power-electronics loads as well as (ii) ride through asymmetrical faults. To address these challenges, this webinar introduces recent advances in grid-forming technology for IBRs with fully rated power converters. Specifically, this talk will report a robust grid-forming strategy to severe restoration transients by leveraging two-axis anti-windup proportional-integral regulators. These compensators are instrumental to limit the development of over-rated currents while maintaining grid-forming operation of IBRs. The performance of this advanced approach will be demonstrated via electromagnetic transient simulations that incorporate mechanical, electromagnetic, power-electronics, and thermal domains. This presentation is based upon work funded by the U.S. Department of Energy, Office of Basic Energy Sciences.

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**1:00-2:00 P.M. EDT**

[LINK TO WEBINAR](#)

(10:00-11:00 P.M. PDT)

Hugo earned his Ph.D. in Electrical and Computer Engineering from Purdue University in 2016 and the M.S. degree from Iowa State University (ISU) in 2011. He joined the Department of Electrical and Computer Engineering at ISU in 2019 where he is a Harpole-Pentair Assistant Professor. Previously, he was a Postdoctoral Researcher of Power Engineering at the National Renewable Energy Laboratory in Golden, CO. He also worked as a supervisor of electrical maintenance for CELEC EP Termopichincha in Ecuador from 2007 to 2009.

Hugo was the recipient of the IEEE Power & Energy Society Prize paper award for 2015 and the Best paper award of the IEEE Transactions on Energy Conversion for 2013–2014. Hugo's research and teaching interests lie at the intersection of electric machinery, power systems, control systems, power electronics, and protections. At ISU, Hugo is affiliated with the Electric Power & Energy Systems group and the Electric Power Research Center. Hugo serves as an Associate Editor of IET Generation, Transmission & Distribution since 2020.

