

Electric Power and Power Electronics Institute

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ENHANCED POWER SYSTEM RESILIENCY TO HIGH-IMPACT, LOW-FREQUENCY EVENTS

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Abstract

Various reliability procedures have been developed to protect the power systems against common reliability issues that threaten the grid frequently. However, these procedures are unlikely to be sufficient for high-impact low-frequency (HILF) events. This presentation proposes several techniques to enhance resiliency with respect to HILF events. In particular, we focus on cyber-physical attacks and geomagnetic disturbances (GMDs). Corrective control through generation re-dispatch is proposed to protect the system from cyber-physical attacks. A modification of the optimal power flow (OPF) is proposed which optimizes the system resiliency instead of the generation cost. For larger systems, the burden of solving the resilience-oriented OPF is reduced through a fast greedy algorithm which utilizes proper heuristics to narrow the search space. Moreover, an effective line switching algorithm is developed to minimize the GMD impact for large-scale power systems. The algorithm uses linear sensitivity analysis to find the best switching strategy and minimizes the GIC-saturated reactive power loss.

Biography

Maryam Kazerooni received her B.S. (2010), M.S. (2012) and Ph.D. (2016) degrees, all in electrical engineering from Sharif University of Technology, University of Windsor, and University of Illinois at Urbana-Champaign, respectively. She is currently a postdoc at Texas A&M University. Her research interests include power system resiliency, cyber-physical security, and geomagnetic disturbances.