PSERC Power Systems Engineering Research Center

PSERC WEBINAR

Power System with 100% Inverter-Based Generation

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This talk discusses control and power sharing architecture for a 100% inverter-based power system. The electric power system, once dominated by traditional synchronous generation, is experiencing a shift toward increased power electronically interfaced generation. This shift is mainly due to increased integration of renewable energy resources, such as wind and photovoltaic (PV) solar. Such an operation scenario has already occurred for short periods in several areas in the United States, Europe, and Australia, and is likely to be more frequent in the future. This shift brings about significant challenges in power system dynamics, stability, and control. In particular, it is imperative to ensure autonomous power sharing among all inverters. The proposed algorithm controls the voltage and real power of the inverter-based generation units to enable them to participate in power sharing based on an angle droop method while respecting their internal limits and preferred set points. The proposed control strategy results in an essentially constant-frequency operation of the power system without relying on secondary controllers. This talk presents research funded by EPRI.

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Ali Mehrizi-Sani received the Ph.D. degree from the University of Toronto in 2011. He is currently an Associate Professor at Washington State University, Pullman, WA. His areas of interest include power system applications of power electronics and integration of renewable energy resources. He is an editor of IEEE Transactions on Power Systems, IEEE Transactions on Power Delivery, IEEE Transactions on Energy Conversion, and IEEE Power Engineering Letters. He is also an editor of Wiley International Transactions on Electrical Energy Systems (ITEES). He was the Chair of IEEE Task Force on Dynamic System Equivalents and Secretary of CIGRE Working Group C4.34 on Application of PMUs for Monitoring Power System Dynamic Performance. He is the recipient of 2018 IEEE PES Outstanding Young Engineer Award, 2018 ASEE PNW Outstanding Teaching Award, 2017 IEEE Mac E. Van Valkenburg Early Career Teaching Award, 2017 WSU EECS Early Career Excellence in Research, 2016 WSU VCEA Reid Miller Excellence in Teaching Award, 2011 NSERC Postdoctoral Fellowship, and 2007 Dennis Woodford prize. He was a Connaught Scholar at the University of Toronto from 2007 to 2011.