Control Strategies for Microgrids

Ali Mehrizi-Sani
School of Electrical Engineering and Computer Science
Washington State University
mehrizi@eecs.wsu.edu

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Description

One of the U.S. grand energy challenges is to enable integration of at least 80% renewable energy resources at a competitive cost in the power grid by 2050. While it is technically feasible to run the U.S. economy on renewable technologies that are available today, what is missing is a flexible power system infrastructure to accommodate the unique characteristics of renewable energy resources, such as susceptibility to violation of operational limits. This problem is exacerbated in small-scale power systems (e.g., microgrids) which have relatively limited resources. In this talk, I will discuss strategies to address these challenges using an add-on control for transient response shaping of controllable devices. This strategy augments an existing controller and enhances its performance by monitoring the response and temporarily modulating the set point. The salient features of this strategy are (i) robustness with respect to system parameters, (ii) independence from the system model, (iii) reliance merely on local signals, and (iv) absence of a need to adjust existing controllers. I will also present case studies to evaluate the performance of this strategy and demonstrate its feasibility.

Biography: Dr. Ali Mehrizi-Sani is currently an Assistant Professor at Washington State University. His areas of interest include power system applications of power electronics and integration of renewable energy resources. He is an Editor of the IEEE Transactions on Power Delivery, the Chair of IEEE Task Force on Dynamic System Equivalents, and the Secretary of CIGRE Working Group C4.34 (Application of Phasor Measurement Units for Monitoring Power System Dynamics). He received academic degrees from Sharif University of Technology and the University of Toronto, and was a visiting professor at Graz University of Technology. He was a recipient of the Natural Sciences and Engineering Research Council's Postdoctoral Fellowship in 2011 and was a Connaught Scholar at the University of Toronto. He received the Dennis Woodford Prize for his M.Sc. thesis.

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