

Power Management and Converter Control for Hybrid AC/DC Microgrids

Abstract

Hybrid AC/DC microgrids with DC and AC sources/loads are considered to be the most likely future microgrid structures, since DC subgrid features high efficiency and free of harmonics/reactive power, and AC subgrid is easy to connect conventional utility grid. A panoramic overview of hybrid AC/DC microgrids is given in this tutorial through the review of ongoing projects. The operation control and power management strategies of hybrid AC/DC microgrids based on the inter support between AC subgrid and DC subgrid are discussed. High penetration integration of renewable generation brings some challenges into hybrid AC/DC microgrids, hence, this tutorial focuses on the coordination control between renewable generation and energy storage. Moreover, as a future trend, the conceptual framework of networked microgrid clusters is introduced to further enhance system operation flexibility. Smart multi-functional services of AC/DC interfacing converters are presented in terms of resilience control, active stabilization, power quality improvement and cost-efficiency optimization.

Instructor Bios:



Kai Sun (M'12-SM'16) received the B.E., M.E., and Ph.D. degrees in electrical engineering from Tsinghua University, in 2000, 2002, and 2006, respectively. He joined the faculty of Electrical Engineering, Tsinghua University, in 2006, where he is currently a Tenured Associate Professor (Research Professor). From Sep 2009 to Aug 2010, he was a Visiting Scholar at Department of Energy Technology, Aalborg University, Aalborg, Denmark. From Jan to Aug 2017, he was a Visiting Professor at Department of Electrical and Computer Engineering, University of Alberta, Edmonton, Canada. His research interests include power electronics for renewable generation systems, microgrids, and energy internet.

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