

Announcement of Distinguished Lecture

Date & Time: June 14 (Thu), 2012, 15:00-16:30

Place: Kyushu University, Ito Campus, West-2 Building, 3F, ISEE-No. 5+6.
744 Moto-oka, Nishi-ku, Fukuoka 819-0395, JAPAN

Sponsors: Kyushu Univ. Green Electronics Circuits Lab. (Shoyama Lab.),
IEEE PELS Fukuoka Chapter, IEEE Kyushu Branch, IEICE Kyushu Branch,
Kyushu Power Academy (TBD)

Smart Grid and Grid Integration of Renewable Energy

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Summary: Large-scale integration of renewable energy is fundamentally changing the characteristics of the power grid. Counteracting the intermittence of renewable sources requires a combination of a variety of technologies, including geographical distribution with strong and flexible transmission lines incorporating FACTS and HVDC, energy storage of various scales and at different levels, as well as demand response and dynamic load management. Power electronics is a critical enabler for all of these technologies. In addition to traditional performance metrics such as cost, efficiency, and reliability, new control functions must be developed to support a smart grid infrastructure.

This talk will review the challenges related to large-scale integration of renewable energy into the power grid. Operational characteristics and control requirements of future grids with deep penetration of renewable energy sources will be discussed and compared with traditional power grid to highlight the need for new system analysis and control techniques. An impedance-based method will be introduced as an integrated framework for the study of both system stability and power quality. A smart-grid system test-bed will also be presented as an experimental platform for small-scale system-level validation and demonstration. The test-bed provides a controlled distribution grid environment that can be programmed to simulate various grid configurations and operation conditions. The design and capabilities of the test-bed will be reviewed, and opportunities for collaboration with the international research community will be offered.

Presenter: Dr. Sun received his PhD degree from University of Paderborn, Paderborn, Germany, in 1995. He was a Post-Doctoral Fellow with the School of Electrical and Computer Engineering, Georgia Institute of Technology, from 1996 to 1997. He worked in the Advanced Technology Center of Rockwell Collins, Inc., from 1997 to 2002, where he led research on advanced power conversion technologies for aerospace applications. In 2002, he joined the Department of Electrical, Computer, and Systems Engineering at Rensselaer Polytechnic Institute, Troy, NY, where he is currently a Professor. Since 2010, he has also been the Director of the New York State Center for Future Energy Systems (CFES), which conducts research in the broad area of energy, including wind, solar, energy storage, smart grid, and smart buildings. His research interests are in the general area of power electronics and energy conversion, with particular emphasis on modeling, control, as well as applications in renewable energy and aerospace. He has published more than 140 journal and conference papers on these subjects, and holds 8 US patents.

Dr. Sun currently serves as the Editor-in-Chief of IEEE Power Electronics Letters, and was the Guest Editor for the IEEE Transactions on Power Electronics Special Issue on Modeling and Advanced Control. He is the Chair of the IEEE Power Electronics Society's Technical Committee on Power and Control Core Technologies and an AdCom Member of the IEEE Systems Council. He has been closely involved in several IEEE PELS-sponsored conferences, including PESC, APEC and, more recently, ECCE. He was the General Chair of IEEE COMPEL'06 Workshop, and will be a Co-Chair of the IEEE 2012 ECCE Technical Committee.