

Advanced Computational Methods for Power System Operations and Management

Speaker:

Professor G. Kumar Venayagamoorthy
PhD, MBA, FIET, FSAIEE, SMIEE

Date: Sunday Nov. 17th
Time: 1:30 to 2: 30
Location: B20 Room 103

Abstract:

The electric power grid of the near-future is evolving into a more complex adaptive and reconfigurable system under semi-autonomous distributed control. Its spatial and temporal complexity, non-convexity, non-linearity, non-stationarity, variability and uncertainties exceed the characteristics found in today's traditional power system. The distributed integration of variable sources of energy and electric vehicles (EVs) into a power system further adds complexity and challenges to its modeling, control and optimization. Innovative technologies are needed to handle the growing complexity, stochastic bidirectional optimal power flows, and maximization of penetration of renewable energy and utilization of available energy storage including PEVs.

Modern power systems, also referred to as the 'smart grid' need to be monitored intelligently to maintain stability, security, reliability, and economical and environmental efficiency under normal and abnormal operating conditions and disturbances. A combination of capabilities for forecasting, predictive estimation, dynamic power flow, system optimization, cybersecurity and solution practicability verification and validation will be necessary for real-time smart grid operations. Optimization and control systems to be resilient will require dynamic information and computational capabilities to handle the uncertainties and variability that exist. Intelligent technologies needed for real-time operations will be presented in this talk.

Biography:

G. Kumar Venayagamoorthy is the Duke Energy Distinguished Professor of Power Engineering and Professor of Electrical and Computer Engineering and Automotive Engineering at Clemson University. Prior to that, he was a Professor of Electrical and Computer Engineering at the Missouri University of Science and Technology (Missouri S&T), Rolla, USA from 2002 to 2011. Dr. Venayagamoorthy is the Founder (2004) and Director of the Real-Time Power and Intelligent Systems Laboratory (<http://rtpis.org>). He holds an Honorary Professor position in the School of Engineering at the University of Kwazulu-Natal, Durban, South Africa. Dr. Venayagamoorthy

received his Ph.D. and MSc(Eng) degrees in Electrical Engineering from the University of Natal, Durban, South

Africa, in February 2002 and April 1999, respectively. He received his BEng (Honors) degree with a First Class from Abubakar Tafawa Balewa University, Bauchi, Nigeria in March 1994. He holds a MBA degree in Entrepreneurship and Innovation from Clemson University, SC. Dr. Venayagamoorthy is an inventor of new computational technologies for tackling complexity of large dynamic systems including smart grid.

Dr. Venayagamoorthy's interests are in the research, development and innovation of smart grid technologies and operations, including intelligent sensing and monitoring, intelligent systems, integration of renewable energy sources, power system optimization, stability and control, and signal processing. He has published over 500 refereed technical articles. His publications are cited over 15,000 times with a h-index of 62 and i10-index of 250. Dr. Venayagamoorthy has been involved in over 75 sponsored projects in excess of US \$10 million. Dr. Venayagamoorthy has given over 500 invited keynotes, plenaries, presentations, tutorials and lectures in over 40 countries to date. He has several international educational and research collaborations.

Dr. Venayagamoorthy is involved in the leadership and organization of many conferences including the General Chair of the Annual Power System Conference (Clemson, SC, USA) since 2013, and Pioneer and Chair/co-Chair of the IEEE Symposium of Computational Intelligence Applications in Smart Grid (CIASG) since 2011. He is currently the Chair of the IEEE PES Working Group on Intelligent Control Systems, and the Founder and Chair of IEEE Computational Intelligence Society (CIS) Task Force on Smart Grid. Dr. Venayagamoorthy has served as Editor/Guest Editor of several IEEE Transactions and Elsevier Journals. Dr. Venayagamoorthy is a Senior Member of the IEEE, and a Fellow of the IET, UK, and the SAIEE.