Power Systems Engineering Research Center

Protection and Control of Systems with Converter Interfaced Generation

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Description: The protection of converter interfaced generation and associated circuits and components is challenging due to (a) insufficient separation between fault and load currents caused by converter interfaced sources, (b) large fault contributions from utility side – small fault contributions from inverter based sources and (c) a requirement to operate in utility connected mode as well as islanded mode. These issues are common for wind systems, PV systems and μGrids. They are addressed with the proposed dynamic state Estimation Based Protection (EBP) method applied to each component of a converter interfaced system and associated components. The paper discusses the issues, presents the EBP method, the integration of the method with the inverter controls and supplementary controls for the purpose of increasing the reliability of these systems. Several examples are provided which compare the proposed protection method with traditional protection functions and inverter control performance improvements enabled with the proposed supplementary controls. The work presented in this webinar is associated with PSERC projects: S-56, T-55G and T-56G.

Biography: Sakis (A. P.) Meliopoulos holds the Georgia Power Distinguished Professorship at the Georgia Institute of Technology, he is the PSERC site director for Georgia Tech and the director for CPS of the newly formed Institute for Information Security and Privacy. He is actively involved in education and research for improved safety and electromagnetic compatibility of electric power installations, protection and control of power systems and the application of new technologies in these areas. Dr. Meliopoulos has pioneered several new analysis and design techniques for bulk power reliability analysis, safety, protection and electromagnetic compatibility of electric power systems. Most well-known is the EPRI transmission reliability program TRELLS (now renamed TransCARE), the GPS-synchronized harmonic state measurement system for transmission systems (first (1993) wide area measurement system on NYPA and still operational), the distributed dynamic state estimation method (SuperCalibrator), the state estimation based protection (a.k.a. setting-less protection), his invention of the Smart Ground Multimeter, the EPRI

grounding analysis programs, the WinIGS (Integrated Grounding System analysis and design), the GEMI (Grounding and ElectroMagnetic Interference) computer code, and the mGrid computer code – a methodology and implementation for precise analysis of multi-wire power systems with distributed energy resources. Dr. Meliopoulos has modernized many power system courses at Georgia Tech, introduced new courses, and initiated the power system certificate program for practicing engineers, and has introduced visualization and animation methodologies that dramatically increase the teaching efficiency of complex power system concepts. Dr. Meliopoulos is a Fellow of the IEEE. He holds three patents and 13 invention disclosures at Georgia Tech. He has published three books, a chapter in the Standard Handbook for Electrical Engineers, and over 300 technical papers. He has received a number of awards, including the Georgia Tech Outstanding Continuing Education Award (2002 and 2014), the IEEE Richard Kaufman Award (2005), and the George Montefiore international award (2010).