



ORLANDO PES/PEL/IAS JOINT CHAPTER

MONTHLY NEWSLETTER

September 2021

Future Events

Challenges to Power System Protection in Presence of Renewables

Date: 21 Oct 2021

Time: 06:00 PM to 08:30 PM

Registration: Starts 20 September 2021 05:00 PM
Ends 21 October 2021 05:00 PM

Link: <https://events.vtools.ieee.org/m/282340>

Speaker: Sukumar Brahma, Ph.D

Abstract:

Power system protection has been conceived and refined through decades of innovation and experience. However, the underlying assumptions behind all protection design and implementation have been that the faulted power system behaves as a linear system, and load currents can be neglected compared to fault currents. These assumptions are under scrutiny as more and more renewables connect at transmission and distribution levels. Renewable generation like solar and wind connect through power converters. The response of the renewable generation to faults depends largely on the converter controls. The controls restrict the fault currents to values comparable to load currents, and can also control the power factor of the fault current. Such response creates problems with various protection functions, and system analysis that underpin the design of some of the protection functions. This presentation will describe the challenges in detail for both transmission and distribution systems, including microgrids, and offer insight into some potential solutions.

The presentation will feature the following main topics:

- 1) Introduction to inverter fundamentals, functionalities, controls, operating modes, and the response of inverters to system disturbances and faults.



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- 2) Impact of inverter based resources (IBRs) on phasor domain short circuit analysis.
- 3) Impact of IBRs on transmission system protection.
- 4) Design and operation of microgrids with high penetration of IBRs.
- 5) Protection of microgrids.

Bio:

Sukumar Brahma received his Bachelor of Engineering from Gujarat University, India, in 1989, Master of Technology from Indian Institute of Technology, Bombay in 1997, and PhD in from Clemson University in 2003; all in Electrical Engineering. He joined Clemson university as the Dominion Energy Distinguished Professor of Power Engineering in August 2018. He also serves as the director of the industry-funded Clemson University Electric Power Research Association (CUEPRA). Before joining Clemson he was William Kersting Endowed Chair Professor at New Mexico State University, USA. Dr. Brahma has chaired IEEE Power and Energy Society's Power and Energy Education Committee, Life Long Learning Subcommittee and Distribution System Analysis Subcommittee. He is a member of the Power System Relaying and Control Committee (PSRCC), where he has been contributing to and leading working groups that produce reports, guides and standards in the area of power system protection. He has been an editor for IEEE Transactions on Power Delivery, and served as Guest Editor-in-Chief for the Special Issue on Frontiers of Power System Protection for the journal. His research, widely published and funded by the National Science Foundation, US Department of Energy, utilities, and other government agencies has focused on different aspects of power system modeling, analysis, and protection. Fundamentally, it spans across diverse areas of electrical engineering and computer science, integrating signal processing, machine learning, control and communication to holistically approach the emerging problems in the power and energy domain. Current research, funded by the US Department of Energy, investigates and addresses protection and fault location issues in integration of renewables with power systems and develops new paradigms in protection of smart grid, at both transmission and distribution levels.

Dr. Brahma is a Distinguished Lecturer of the IEEE. He was elected IEEE Fellow "for contributions to power system protection with distributed and renewable generation".

Links to photograph:

<https://clemsun.box.com/s/ckx5sju6s9qg6fp0bwdar5maoshmrc4i>



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IEEE Orlando PES/PEL/IAS members highlights

Lucas Sweet

Lucas Sweet serves the IEEE Orlando PES/PEL/IAS Joint Chapter as its webmaster, serving since 2021. Lucas has been an active member of IEEE since starting his core engineering classes at the University of Central Florida. He served as the chair for the student chapter of IEEE PES at UCF during 2018-2019 until graduating with his Bachelors in Electrical Engineering in 2019. After graduation Lucas elevated his IEEE status and joined the IEEE Orlando PES/PEL/IAS Joint Chapter's Excom where he volunteered as the chapter needed until assuming the webmaster role. Lucas works for Leidos as an Associate Distribution Engineer, his work focus is on feeder hardening projects for utility companies in the southeastern US.

Miscellaneous

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