



2022 PSERC Summer Tutorial

Wavelet-based Digital Signal Processing for Protection, Monitoring, and Control of Smart Grids

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This tutorial will provide a brief overview of the development of novel real-time signal processing tools based on the wavelet transform for accurate and fast monitoring, protection, and control of smart grids. The wavelet theory has included a mathematical improvement to make it more sensitive to power system disturbances and useful for practical applications, as: 1) real-time detection, classification, and location of faults in ac and dc transmission lines; 2) detection of high impedance faults; 3) new protections systems based on overcurrent, overvoltage, directional, and differential principles with applications in transmission lines and power transformers; 4) traveling wave-based fault location and protection; 5) real-time detection of power quality disturbances; 6) real-time estimation of power, harmonics, impedance, and frequency; 7) islanding of microgrids; 8) control of power systems. These case studies consider real-world data, experimental setup, and real-time hardware-in-the-loop simulations.

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REGISTRATION

2:00 – 3:30 P.M. EDT

(11:00 - 12:30 P.M. PDT)

Flavio B. Costa earned his B.Sc., M.Sc., and Ph.D. degrees in Electrical Engineering from Federal University of Campina Grande (UFCG), Brazil, in 2005, 2006, and 2010, respectively. Currently, he is an Assistant Professor in the Electrical and Computer Engineering Department and Michigan Technological University since December 2021. He was a professor at the Federal University of Rio Grande do Norte (UFRN), Brazil, from 2010 to 2021. He was a postdoctoral fellow at UFCG, Brazil. He was a visiting fellow at K.U. Leuven, Belgium, and at INESC Porto, Portugal. He was a postdoctoral fellow at the Institute for Automation of Complex Power Systems (ACS) at the Rheinisch-Westfälische Technische Hochschule Aachen (RWTH AACHEN) University, Germany. He was visiting professor at TU Berlin, Germany. His research interests lie in the broad area of generation, transmission, and distribution systems, including power system protection and control, real-time analysis of power quality disturbances and faults, integration of renewable energy systems, as well as smart grid solutions.

