

Electric Power and Power Electronics Institute

INVITED SEMINAR (SPECIAL TIME)

Thursday April 23, 4-4:50pm, WEB 236C

Prospective Applications of Synchrophasors in Voltage Security and Out-of-Step Protection

Prof. Glauco N. Taranto
Programa de Engenharia Eletrica
COPPE/UFRJ, Brazil

Abstract

Synchronized phasor measurement technology, although being not new in electrical power systems, has experienced a widespread utilization in various applications, ranging from monitoring, state estimation, protection, control, etc. The great momentum synchrophasors gained in the last few years, is due to cost reduction, better communication infrastructure, and the development of useful applications. Furthermore, the development of standards by organizations like IEC and IEEE is helping to solidify the role of synchrophasors in the power industry. This seminar will focus on two prospective applications of synchrophasors in bulk power systems: the first on the detection of voltage instability and the second on out-of-step (OOS) protection. The voltage instability detection application is based on the Thevenin equivalent “seen” from a load bus. The voltage instability is linked to the condition of equality between the absolute value of two impedances – the load impedance calculated from local voltage and current phasors – and the Thevenin equivalent impedance estimated also from the same local voltage and current phasors. The impedance matching corresponds to the maximal power transfer which is closely related to the voltage instability point. The OOS protection application is based on an algorithm that uses the first and second derivatives of the angular difference of suitable voltage phasors. Better anticipation characteristics yielding to less impact on the system are observed. For the former application, simulated results in the Italian power system and preliminary measured results in the Brazilian power system will be shown. For the later application simulated results in the Uruguayan power system will be presented.

Speakers Bio

Glauco N. Taranto (S’92–M’96–SM’04) received the B.Sc. degree in 1988 from the State University of Rio de Janeiro, Rio de Janeiro, Brazil, the M.Sc. degree in 1991 from the Catholic University of Rio de Janeiro, and the Ph.D. degree in 1994 from Rensselaer Polytechnic Institute, Troy, NY, all in electrical engineering.

In 2006, he was on sabbatical leave as a Visiting Fellow at CESI, Milan, Italy. Since 1995, he has been with the Electrical Engineering Department, Federal University of Rio de Janeiro/COPPE, Brazil, where he is currently a Full Professor. His research interests include power system dynamics and controls, robust control design, synchrophasor applications and distributed generation.

Prof. Taranto was the president of the IEEE Rio de Janeiro Section in 2008-09, and the IEEE Power & Energy Society Chairman of the Rio de Janeiro Chapter in 2010-11. He was the general chairman of the Bulk Power System Dynamics and Control IREP Symposium 2010, held in Buzios, Brazil. Prof. Taranto is a member of the IEEE PES and CSS, Power System Dynamic Performance Committee and CIGRE. He is the secretary of the Power System Stability Subcommittee and the Brazilian member in the CIGRE WG-C2.13 on “Voltage and var support in system operation”.