

Title: Sustainability and Resiliency Enhancement of Electric Power and Communications Systems

Speaker: Lamine Mili Department of Electrical and Computer Engineering Virginia Tech, Northern Virginia Center Falls Church, VA 22043, USA

In this talk, we will discuss risk management methods aimed at enhancing the robustness and the resilience of interdependent electric power and communications infrastructures to various hazards, including hurricanes. Robustness is defined as the ability of a system to undergo small instabilities when it is subject to small perturbations. It is enhanced by hardening the system via additional structural redundancy and via preventive actions taken by hierarchical centralized controllers that are designed under spatial- and time-scale decomposition principles. On the other hand, resilience is defined as the ability of a system to gracefully degrade and to self-recover to a normal state following unexpected cascading events leading to a major catastrophic failure. Resilience is enhanced via structural system segmentation into weakly coupled subsystems and via distributed and coordinated corrective control actions taken by multi-agents that supervise a host of microgrids. We will show how in the planning phase, a trade-off between robustness and resilience can be achieved by means of a risk-based optimization problem subject to a bound in the cost of additional resources that the infrastructures ought to be provided with.

Bio: Lamine Mili is a fellow of the IEEE and a professor of Electrical Engineering at Virginia Tech. He received the Electrical Engineering Diploma from the Swiss Federal Institute of Technology, Lausanne, Switzerland, in 1976, and the Ph.D. degree from the University of Liège, Liège, Belgium, in 1987. He is a Professor of electrical and computer engineering with Virginia Tech, Blacksburg, VA, USA. He has five years of industrial experience with the Tunisian electric utility, STEG. At STEG, he worked in the planning department from 1976 to 1979 and then at the Test and Meter Laboratory from 1979 to 1981. He was a Visiting Professor with the Swiss Federal Institute of Technology in Lausanne, the Grenoble Institute of Technology, the École Supérieure D'électricité in France and the École Polytechnique de Tunisie in Tunisia, and did consulting work for the French Power Transmission company, RTE. His research has focused on power system planning for enhanced resiliency and sustainability, risk management of complex systems to catastrophic failures, robust estimation and control, nonlinear dynamics, and bifurcation theory. He is the Co-Founder and Co-Editor for the International Journal of Critical Infrastructure. He is the Chairman of the IEEE Working Group on State Estimation Algorithms. He is a recipient of several awards including the U.S. National Science Foundation (NSF) Research Initiation Award and the NSF Young Investigation Award.