Title: Modeling, Simulation, and Vulnerability Analysis of Electric Power Systems

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Abstract:

Electric power systems of interest to national security are large-scale, nonlinear, interdependent dynamic systems comprised of heterogeneous components. This brief will describe new developments in the Complex Additive Systems Analysis (CASA) approach to modeling, simulation and vulnerability analysis of these electric power systems. CASA’s unique approach to modeling these systems captures their fundamental dynamic and decision-making processes while maintaining modest data requirements for realistic collection expectations, scalability for application to real-world systems, and tractability for efficient simulation and mathematical analysis. This analysis includes identification of system interdependencies using control and system theoretic approaches that provide a means to perform vulnerability assessments, construct exploitation/mitigation approaches, and predict time-series responses. Results provide the decision-maker with quantitative vulnerability conclusions and a simulation to visualize key information.