Electric Power and Power Electronics Institute

WEEKLY SEMINAR SERIES – FALL 2018

Monday, September 17th, 2018, 3:00 – 4:00 p.m., ETB 1003

Quantifying Power System Resilience Enhancement Using Network Reconfiguration

Pooria Dehghanian
Ph.D. Student at Texas A&M University

Abstract

Global environmental variations in the past two decades have contributed to a significant deviation of classic ecological patterns, leading to severe electricity outages triggered by extreme weather-driven phenomena. From the electrical safety point of view, it is essential to increase the operators' awareness on a better understanding of such hazards and grid vulnerabilities, and enhance their preparedness on how to respond or mitigate the probable outages. This study proposes a temporary restoration strategy in response to the forecasted HILP events, founded based on efficient utilization of the current grid infrastructure, and aim at improving its resilience in the face of such extreme emergencies. The applied concept of reconfiguration is proactively planned to recover the electricity outages in a timely manner. In the meantime, two types of metrics are proposed to quantify both the grid operational and infrastructure resilience. The presented framework aids the system operator to evaluate the outage recovery options considering their impacts on system resilience and decide on the final plan for implementation. The proposed approach is applied to the IEEE 118-bus test system facing with HILP events, and the results reveal its applicability and efficiency.

Biography

Pooria Dehghanian received the B.Sc. degree from Shahid Bahonar University of Kerman, Iran, in 2010, and the M.Sc. degree from the Texas State University, Texas, USA, in 2017, both in Electrical Engineering. He is currently a Research Assistant with the Department of Electrical and Computer Engineering, Texas A&M University, where he is pursuing the Ph.D. degree. His research interests include geomagnetic disturbance and geomagnetically induced current analysis, power system resilience, power system stability assessment, and smart electricity grid applications.

Locational Dependence of Inertial's Impacts on Critical Clearing Time

Yijing Liu
Ph.D. Student at Texas A&M University

Abstract

With the integration of renewable energy, system inertia may have a trend of decreasing in recent years, which increases the likelihood of transient instability. Inertia has impacts on voltage profiles and such impacts vary by location. After the system is subject to faults on buses or on transmission lines, bus voltages change differently as sum of inertia varies in sites that are either near or far away from violation locations. Critical clearing time (CCT) is a metric assessing condition of system stability. In this talk I'll explain how inertia changes affect CCT and how such impacts are location-dependent. An insightful preliminary study is carried out to reveal how inertia comes into play in bus voltage levels. Two case sets considering different oscillations are presented to verify inertia's locational impacts on CCT.

Biography

Yijing Liu (S'17) received her B.S. degree in 2017 from University of Electronic Science and Technology of China, Chengdu, P.R.C.. She is now a graduate student in Electrical and Computer Engineering at Texas A&M University, College Station, Texas. She's currently doing research in power system transient stability analysis and protection in power system.