Spring 2018 Seminar Series

Real-time Volt/Var Optimization for Distribution Systems with Photovoltaic Integration

FRIDAY FEBRUARY 9, 2018

2:00 PM EST – HEC 356

The increasing penetration of distributed photovoltaic (PV) generation presents both challenges and opportunities for distribution networks. In this seminar, we will introduce a two-stage optimization approach to mitigate the rapid voltage fluctuations and minimize the power losses of distribution systems due to the high penetration of PV generation. The first stage is a day-ahead optimal strategy, which aims to minimize the total voltage deviations and power losses within the constraints of the daily maximum allowable number of operations of the on-load tap changers (OLTCs) and shunt capacitors (SCs). The second stage is a real-time inverter reactive power control to compensate for the uncertainties of PV output and load demand. As a part of the real-time control, an artificial neural network (ANN) approach is used to estimate the system states. In both stages, the optimization problems are formulated as nonlinear optimization problems and solved with direct search algorithms. The real-time optimization method is tested on a Hardware-In-the-Loop (HIL) simulation platform.

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Miss Yan Chen received her B.S. and M.S. degrees from Huazhong University of Science and Technology (HUST), China, in 2009 and 2013 respectively. From 2011 to 2012, she studied as a visiting student at Information and Communication Technologies Center, Commonwealth Scientific and Industrial Research Organization (CSIRO), Sydney, Australia. She is currently pursuing the Ph.D. degree in the Department of Electrical Engineering, University of South Carolina, Columbia, USA. Her research interests include power system simulation, probabilistic analysis, optimization control, and the smart grid.