



## Recent Advances in Mixed-Integer Distribution Grid Optimal Power Flow (DOPF) Modelling and Applications

~ by ~

**Dr. Sumit Paudyal**

Associate Professor, Dept of Electrical and Computer Engineering  
Florida International University

**Tuesday, September 14 • 11:00 AM – Noon (PT) • TEAMS ONLY**

[\[Click here to join meeting\]](#)

### OVERVIEW

Distribution grid optimal power flow (DOPF) problem for unbalanced systems are extensively explored in the literature as the number of controllable assets (e.g., flexible loads and distributed energy resources) are increasing in power distribution grids. However, a large body of work does not consider modeling of legacy grid control devices, i.e., on-load tap changers (OLTC) and capacitor banks, in DOPF as this control equipment introduce integer variables in the DOPF models leading to mixed-integer formulations. Optimal control of legacy grid devices is essential for various grid applications including Volt/VAr control; however, conventional mixed-integer non-linear programming (MINLP) formulation of DOPF does not scale up for large grids. This technical talk presents state-of-the-art methods in handling DOPF problem with integer decision variables using mixed-integer linear and convex formulations, and discusses the efficacy and scalability of the DOPF models in managing Volt/VAr in a large-scale three-phase (2500+ node) distribution feeder.



### BIO

**Dr. Sumit Paudyal** is Eminent Scholar Chaired Associate Professor in the Department of Electrical and Computer Engineering at Florida International University. Dr. Paudyal received MS in Electrical Engineering from the University of Saskatchewan, Canada in 2008, and PhD in Electrical Engineering from the University of Waterloo, Canada in 2012. He was a faculty member in the Department of Electrical and Computer Engineering at Michigan Technological University from 2012 to 2019. He is the recipient of National Science Foundation Faculty Early CAREER Award in 2018, and Eta Kappa Nu (HKN) Best Professor of the Year (for teaching) at Michigan Tech in 2018. He is currently serving as an Associate Editor of the IEEE Transactions on Smart Grids and the IEEE Transactions on Industry Applications. Dr. Paudyal's recent research activities include distribution grid modeling, optimization applications in Smart Grids, and power system control and protection, and have been supported by NSF, ARPA-E, and DOE.