

Optimization and Stabilization of Hierarchical Electrical Networks

Triggered by the increasing number of renewable energy sources, the German electricity grid is undergoing a fundamental change from mono to bidirectional power flow. This paradigm shift confronts grid operators with new problems but also new opportunities. In this talk we point out some of these problems arising on different layers of the grid hierarchy and sketch mathematical methods to handle them. While the transmission system operator's main concern is stability and security of the system in case of contingencies, the distribution system operator aims to exploit inherent flexibilities. We identify possible interconnections among the layers to make the flexibility from the distribution grid available within the whole network.