

Title: Optimal Usage of Transmission Capacity Using Power Flow Control Devices

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Sponsor: PSERC, Bonneville Power Administration (BPA), SRC Smart Grid Research Center

Contributing Faculty: Gabriela Hug

Contributing Students: Rui Yang

Description:

Power flow control devices, such as Flexible AC Transmission Systems (FACTS) provide the opportunity to influence voltages and power flows. Hence, these devices allow making better usage of the existing transmission system and to enhance system security. In this project, the effectiveness of power flow control devices to reduce the loading on lines and therefore to increase the amount of power which can be pushed through the existing transmission system is investigated. A major focus is on developing a regression-based control scheme allowing the determination of the optimal settings of these devices in a decentralized way. By the means of the learning algorithm, the proposed approach could determine the close-to-optimal device settings in online operation without carrying out OPF calculations. Two different objectives for controlling the FACTS devices have been considered. One is to maximize the minimum capacity margin of the transmission lines which enables the optimal utilization of the transmission capacity and the other one is to minimize the system risk for enhancing system security. A risk-based formulation is used to quantify the level of system security and corrective approach for FACTS devices is used to minimize the system risk. The optimal device settings are determined by the regression-based control framework.