Dynamic Stochastic Optimal Power flow (DSOPF) Control for Power Systems with High Variability

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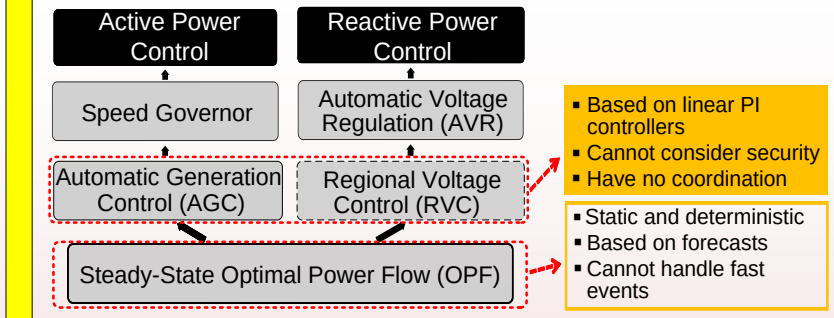
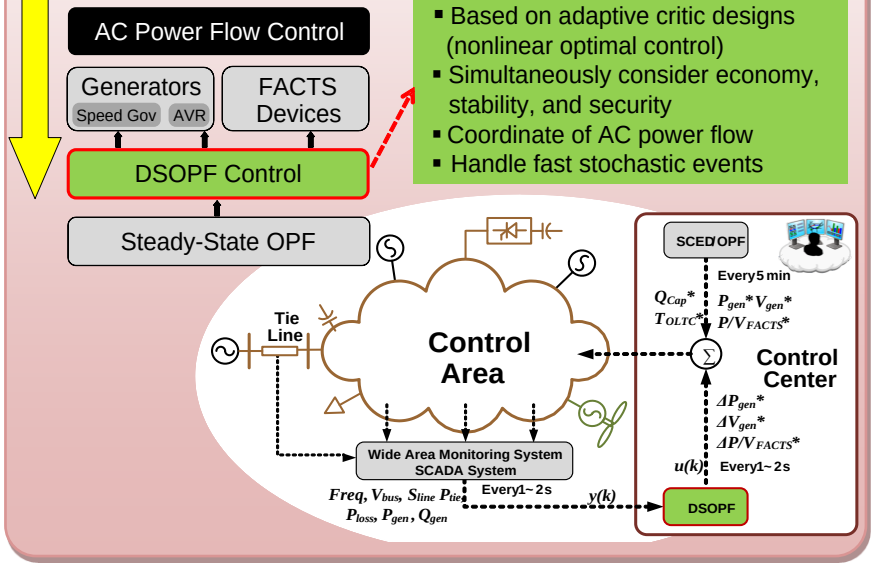
To achieve a high penetration level of intermittent renewable energy, power system stability and security need to be ensured dynamically as the system operating condition continuously changes. A DSOPF control algorithm using adaptive critic designs (ACDs) is proposed as a solution to control the smart grid in an environment with high short-term uncertainty and variability.

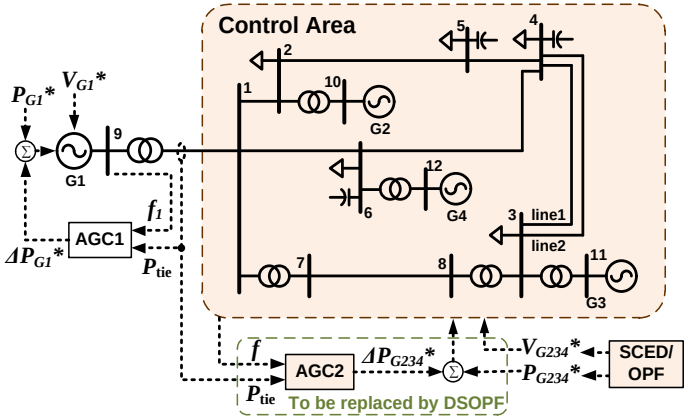
Traditional Power System Control and Operation



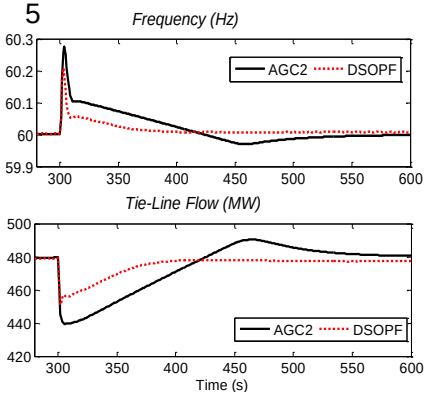
DSOPF-Based Smart Grid Control and Operation



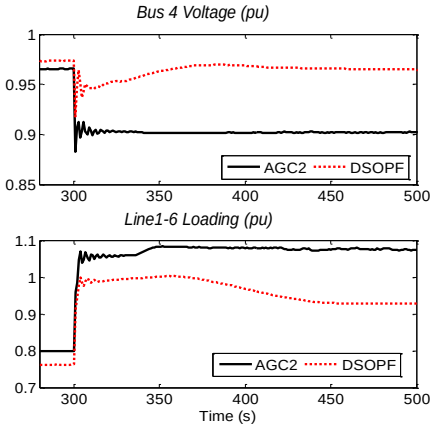
•*Example: 12-bus test power system*



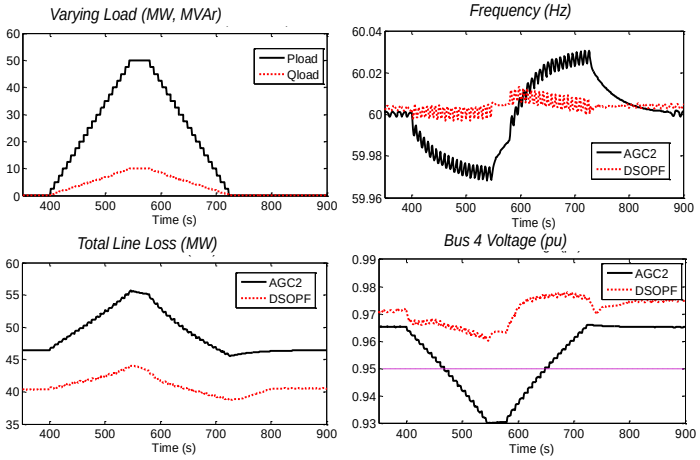
Case1: load & cap tripped at bus 5



Case2: line 2-5 outage



Case3: large short-term varying loads at buses 4&5



•J. Liang, R. G. Harley, and G. K. Venayagamoorthy, "Adaptive critic design based dynamic optimal power flow controller for a smart grid," in *Proc. 2011 IEEE Symposium Series on Computational Intelligence – Computation Intelligence Applications in Smart Grid (CIASG)*, Paris, France, Apr. 11-15, 2011.

•J. Liang, G. K. Venayagamoorthy, and R. G. Harley, "Wide-area measurement based dynamic stochastic optimal power flow control for smart grids with high variability and uncertainty," *IEEE Trans. Smart Grid*. Under review.