Global Transient Stability and Voltage Regulation for Multimachine Power Systems

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This paper addresses simultaneously the major fundamental and difficult issues of nonlinearity, uncertainty, dimensionality and globality to derive performance enhancing power system stability control. The main focus is on simultaneous enhancement of transient stability and voltage regulation of power systems. This problem arises from the practical concern that both frequency and voltage control are important indices of power system control and operation but they are ascribed to different stages of system operation, i.e. the transient and post transient period respectively. The Direct Feedback Linearization (DFL) technique together with the robust control theory has been further developed and applied to design nonlinear excitation compensators which selectively eliminate system nonlinearities and deal with plant uncertainties and interconnections between generators. Then the so called global control law is implemented to coordinate transient stabilizer and voltage regulator for each machine. Digital simulation studies show that global control scheme achieves unified transient stability and voltage regulation in the presence of parametric uncertainties and significant sudden changes in the network topology.

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