Design of Fuzzy Logic Based Global Power System Stabilizer for Dynamic Stability Enhancement in Multi-Machine Power System

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Abstract : This paper describes the diligence of a new input signal based fuzzy power system stabilizer in multi-machine power system. Instead of conventional input pairs like speed deviation ($\Delta\omega$) and derivative of speed deviation i.e. acceleration ($\Delta\omega^{\cdot}$) or speed deviation and accelerating power deviation of each machine, in this paper, deviation of active power through the tie line colligating two areas is used as one of the inputs to the fuzzy logic controller in concurrence with the speed deviation. Fuzzy Logic has the features of simple concept, easy effectuation, and computationally efficient. The advantage of this input is that, the same signal can be fed to each of the fuzzy logic controller connected with each machine. The simulated system comprises of two fully symmetrical areas coupled together by two 230 kV lines. Each area is equipped with two superposable generators rated 20 kV/900MVA and area-1 is exporting 413 MW to area-2. The effectiveness of the proposed control scheme has been assessed by performing small signal stability assessment and transient stability assessment. The proposed control scheme has been compared with a conventional PSS. Digital simulation is used to demonstrate the performance of fuzzy logic controller.