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Stability Analysis of Multi-Machine Power System for Inter-Area Oscillations under Different Time-Delay in Control Signal for PSS

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Abstract – This paper presents a novel approach in order to improve power system stability by designing phasor measurement technology (PMU) based wide area damping controller (WADC). Wide area power system stabilizer (WPSS) is one of the most potentially effective approaches to damp inter-area oscillations in power system in WADC. Data measured by PMUs transmitted to controller through the communication channels, in this transmission network time delay is unavoidable, and to deal with this kind of time delay problem we used Padé approximation approach. The work is related to designing a wide area damping controller for inter-area oscillations damping for two-area four-machine power system model which identify the inter-area oscillations through modal analysis and selected most affective wide area signal for power system stabilizer by using geometric approach. Proposed methodology is used to damp out inter-area oscillations under different signal delay. Simulation results concluded that for multi machine power system, the inter-area oscillation with signal delay which is very dangerous and can be easily damped out with the proposed approach.

Keywords - DAE, GA, Padé Approximation, PMU, PSS, WADC, WPSS.