

Performance of 2-DOF PID Controller in AGC of Two Area Interconnected Power System Using PSO Algorithm



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Abstract Automatic generation control (AGC) serves a great performance in conventional power systems for delivering the reliability of power supply to all consumers. The toughest task in the multi-area power system is to stabilize the changes in frequency and inter-area line power. In this work, proportional integral (PI), proportional integral derivative (PID), and 2-degree freedom of PID (2-DOF-PID) controllers are proposed in AGC system for nullifying the unnecessary oscillations in frequency and tie-line power. When the system would be complex, then these controllers do not give efficient outcomes because of it having fixed gain values. Therefore, in this work, particle swarm optimization (PSO) algorithm is formulated for tuning the gain values of the suggested controllers in multi-area interconnected system. In order to alleviate the frequency and inter-area power line deviations, the tuned 2-DOF-PID controller has rendered a better dynamic performance with respect to settling time, overshoot and undershoot. Likewise, the robustness of the system has ascertained while fluctuating the loading circumstances and system specifications up $\pm 25\%$ from their prescribed values which helped to exhibit the ability of the recommended method. Finally, the simulation outcomes disclosed the PSO optimized 2-DOF-PID has given the favorable dynamic performance over the other control approaches.

Keywords Automatic generation control · Particle swarm optimization algorithm · Multi-source power system · 2-DOF PID · Sensitivity analysis

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