Artificial Intelligent-Based Design of Fractional Order PID for a Hybrid Renewable Energy System

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ABSTRACT

Abstract— Due to the increased penetration level of renewable energy and their uncertain nature in power system, the risk of frequency instability is increased. Recently, Fractional Order-PID (FO-PID) controller is implemented in frequency control for their superiority over classical-PID controller. However, FO-PID controllers are often poorly tuned into practice. In this paper an optimized FO-PID Controller is proposed to minimize the frequency deviation of Hybrid Renewable Energy System (HERS). The parameters of the proposed controller are tuned by Particle Swarm Optimization (PSO). The results of the proposed controller are compared with those obtained using the conventional tuning and the Genetic Algorithm (GA) under various control objectives. The effectiveness of the proposed controller is verified under the variation in the power of solar, wind turbine, and the load demand.

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