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Chapter 7

Design of MPC-TSA Controller for Hybrid Two-Area Power System

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Summary

In the past several decades, the discipline of control has seen significant advancements in model predictive control (MPC). It offers several benefits, including quick reaction times, steadiness against nonlinear behaviors, and parametric uncertainties. The control input for MPC, which is also termed as control of the receding horizon, is derived by evaluating a discrete-time optimum control problem over a predetermined horizon. This chapter proposes the tree-seed algorithm (TSA) for most ideal MPC controller settings for a two-area interconnected hybrid power system (2-AIHPS) that includes thermal and nuclear units along with non-conventional energy sources (NCES) like ocean thermal power plant (OTPP) and solar plant to reduce power system pulsations. TSA is used to find the best controller settings by minimizing a time-domain–based fitness function such as the integral-time multiplied squared error (ITSE). The performance of the suggested controller may be assessed by contrasting it with TSA-based PID and conventional control approaches like PSO-based PID. In the MATLAB simulation platform, the entire system (2-AIHPS), including the controllers, is sketched and modeled. Simulation outcomes such as settling time (ST), overshoot (OS), and undershoot (US) on a 2-AIHPS are analyzed for all controlling methods discussed above. The suggested controller outperforms other controllers found in the literature on account of its robustness to load variations.

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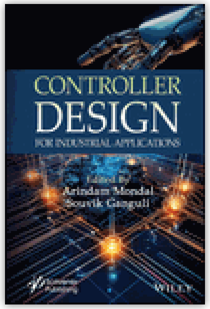

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