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Optimal Control of Hybrid Power System Integrated with Distributed Generation and Electric Vehicle

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Abstract

This study presents load-frequency-control of a two-area hybrid power system (HPS) incorporating distributed generation, geo-thermal plant, thermal plant and electric-vehicle. Such a complex system with non-linearities leads the power system towards more complexity and accordingly requires a resilient controller to handle such complexity. In this regard, optimal cascaded proportional integral – multistage proportional integral derivative (cascaded PI-MSPID) is explored for developed power system. The efficiency of optimal controller is validated by comparing it with other controllers. The influence of flywheel energy storage on system dynamics is demonstrated. Further, the electric vehicle's participation in enhancing the system stability is presented. Moreover, the developed system is subjected to an intense load deviation which is a practical data taken from one of the literature. It is demonstrated that responses achieved for proposed cascaded PI-MSPID controller effectively handles the system disturbances, which reflects the strength of proposed cascaded PI-MSPID controller.

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