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RESEARCH ARTICLE

Analysis of Fuzzy Logic Controller (FLC) based Hybrid Energy System Fed Microgrid

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ABSTRACT

This paper proposes a fuzzy logic controller (FLC) based hybrid energy system fed microgrid. Generally, most of the researchers consider PI controllers for controlling the proposed system but tuning the gain values of PI is difficult due that getting more errors and adding extra passive elements for compensating frequency fluctuations. In this project, we propose FLC with a model predictive control (MPC) Controlling three-level bidirectional DC/DC converters for grid connections to a HESS in a DC microgrid to begin, a mathematical model of a HESS with a battery and ultra-capacitor (UC) is created, and the neutral point voltage imbalance of a three- level converter is addressed by examining the converter 39;s operating modes. Second, an MPC approach for calculating steady-state reference values in the outer layer and dynamic rolling optimization in the inner layer is proposed for grid-connected converter control. The outside layer guarantees voltage regulation and creates a current predictive model, while the inner layer uses model predictive current control to make the current follow the predicted value, eliminating system current ripple. To realize the high-and low-frequency power allocation for a HESS, this cascaded architecture features two separate controllers and is devoid of filters. As a result, it enables two types of energy storage devices to separately regulate voltage and realizes battery and UC power allocation. Finally, simulation results are designed in MATLAB SIMULINK environment. And obtained results are proof that the proposed system is better than the conventional system.

Keywords: Hybrid energy system; Model predictive control, fuzzy controller.