2013 International Journal of Hydrogen Energy

Control design and power management of a stationary PEMFC hybrid power system

Fu-Cheng Wang, Po-Chen Kuo, Hsueh-Ju Chen

Abstract

This paper develops robust control and power management strategies for a 6 kW stationary proton exchange membrane fuel cell (PEMFC) hybrid power system. The system consists of two 3 kW PEMFC modules, a LieFe battery set, and electrical components to form a parallel hybrid power system that is designed to supply uninterruptible power to telecom base stations during power outages. The study comprises three parts: PEMFC control, power management, and system integration. First, we apply robust control to regulate the hydrogen flow rates of the PEMFC modules in order to improve system stability, performance, and efficiency. Second, we design a parallel power train that consists of two PEMFC modules and one LieFe battery set for the uninterruptible power supply (UPS) requirement. Lastly, we integrate the system for experimental verification. Based on the results, the proposed robust control and power management are deemed effective at improving the stability, performance, and efficiency of the stationary power system