

## **Control and Power Management of a Hybrid Stationary Fuel Cell System**

Yi-Fu Kuo, Po-Chen Kuo, Hsueh-Ju Chen, Chung-Huang Yu and Fu-Cheng Wang\*

### **Abstract**

This paper proposes robust control and power management strategies for a 6kW stationary fuel cell hybrid power system. The system consists of two 3kW PEMFC modules, a Li-Fe battery set and electrical components to form a parallel hybrid power system that is designed for telecom base stations to supply uninterruptible power during emergency power failures. The study is carried out in three steps: the PEMFC modules control, power management, and system integration. First, we apply robust control to regulate the hydrogen flow rates of the PEMFC modules to increase system stability, performance, and efficiency. Second, we design a parallel power train that consists of two PEMFC modules and one Li-Fe battery set for uninterruptible power supply (UPS) requirement. When the main power is shut down, the Li-Fe battery will activate PEMFC modules. Then the PEMFC modules provide steady power at low current loadings. At high loading, both PEMFC modules and the Li-Fe battery set will simultaneously provide electricity. Lastly, we integrate the system for experimental verification. Based on the results, the proposed robust control and power management are deemed effective in improving stability, performance and efficiency of the stationary power system.