

Multivariable Robust Control for a 500W Self-Humidified PEMFC System

Fu-Cheng Wang, Ming-Cheng Chou and Chih-Chun Ko

Abstract

This paper illustrates the integration and control of a 500W self-humidified proton exchange membrane fuel cell (PEMFC) system. From the system point of view, a PEMFC can be regarded as a two-input-two-output system with voltage and current. By identification techniques, we find transfer functions of the PEMFC system at different operating points, and treat the un-modeled dynamics as system uncertainties. Thus, robust control strategies can be applied to stabilize the system and increase the system performance. In this paper, we design a standard H_∞ robust controller to stabilize the PEMFC system, and further apply fixed-order robust control. Finally, the system performance and efficiency are experimentally verified. The results show the effectiveness of these controllers.