



University of Hawai'i at Mānoa

Hawai'i Natural Energy Institute

School of Ocean & Earth Science & Technology

Latest Hardware-in-Loop Development and Fuel Cell Vehicle Simulation

The HNEI Hardware-in-Loop (HiL) fuel cell dynamic tester has been evaluated and in operation testing PEM fuel cells under dynamic application conditions for nearly a year. The aim of the Fuel Cell HiL process is to provide a methodology for evaluating a specific fuel cell designs (geometry, materials, flow fields, etc.) under conditions relevant to a particular dynamic application and use pattern. However, the original software and data communication means typical of those provided by static test system vendors, and utilized in static fuel cell testers, were totally incapable of providing the dynamic response required for Fuel Cell HiL. Hence, the original controller configuration of the Fuel Cell HiL dynamic tester has been revised and performance vastly improved over the past year.

This presentation will first introduce to the Fuel Cell HiL concept in terms of hardware and software interface and other capabilities of the HiL tester. Then, the presentation will focus on the design and latest improvement of the prototype HiL dynamic tester and comparison of the original and new controller architecture. The major features of the new prototype HiL system will be also presented. Finally, typical experimental results will be presented to illustrate the intermediate-mode HiL dynamic test system response achieved for the real-time simulation of a direct-hydrogen fuel cell vehicle (DHFCV) with two different design configurations.

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Tuesday, April 17, 2007

3:15 – 4:15 PM

POST 723

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