



University of Hawai'i at Mānoa

Hawai'i Natural Energy Institute

School of Ocean & Earth Science & Technology

Real Time Simulation of a Dynamic Fuel Cell System Application using Hardware-in-Loop Methodologies

A dynamic fuel cell system model of an ethanol-powered APU (Auxiliary Power Unit) was created using Matlab/Simulink. The model was converted into realtime and made capable for Hardware-in-Loop testing. The virtual fuel cell of the model was replaced by a real fuel cell in a Hardware-in-Loop (HiL) test stand. Results of the simulation and the HiL tests were evaluated, particularly with regard to dynamic responses of the system. The obtained data were also compared to measured data of a similar Idatech APU system powered with methanol and discussed in terms of efficiency, fuel consumption, temperatures of system components, exhaust composition, et cetera.

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