University of Hawai`i at Mānoa

Hawai`i Natural Energy Institute

School of Ocean & Earth Science & Technology

Dynamic Polymer Electrolyte Membrane Fuel Cell Model in Modelica

This presentation will describe a dynamic and spatially distributed (quasi 2-dimensional) Polymer Electrolyte Membrane (PEM) fuel cell model that has been created in the Modelica physical modeling language. Fuel cell modeling results will be discussed for hydrogen/air and hydrogen/oxygen operation, reactant co-flow or counter-flow, as well as dynamically varying conditions including flow rate, temperature, pressure, humidity, and electrical load. The model offers selectable assumptions for water transport, resistivity, and overpotential, e.g., constant or water-content-dependent diffusion coefficients. The results will demonstrate that Modelica's flexibility can be used to evaluate various physical assumptions and can be utilized for a variety of systems and applications.

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