

MCFC System Modeling and Parametric Study

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Mathematical modeling is an essential tool for the design of molten carbonate fuel cell (MCFC) system. This study aims to develop a MCFC system and conduct parametric study. The system consists of a fuel cell stack and mechanical balance of plant(MBOP), which includes heat exchangers, pre reformers, after burners, polishers, and other devices. Each component is developed separately based on mass and energy balances, and an electrochemical equations that relates the fuel and air gas composition and temperature to voltage, current density, and other variables. These components are integrated into a MCFC system model using embedded MATLAB functions and simulink.

Based on the system model, system responses with respect to different parameter values are observed. The system responses are analyzed and major parameters are examined.