Dynamic Modeling of Molten Carbonate Fuel Cell

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A dynamical model of a direct internal reforming (DIR) molten carbonate fuel cell(MCFC) system has been developed for the pupose of control system design. The model consists of the mass, energy, and charge balance equations to express the cathode/anode/solid behaviors of an MCFC. According to the DIR assumption, both reforming and electrochemical reactions are considered to be simultaneously carried out in the anode. Spatial distribution over the surface of the cell is considered to predict the temperature distribution, which may be excessive depending on the operating conditions and cause operating difficulties. How to derive a reduced-order model that can be used for controller construction is also discussed.