

Computational Fluid Dynamics Modeling of Direct Methanol Fuel Cells and Parametric Study – The Effect of Membrane Thickness

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A two-dimensional, two-phase, isothermal model for liquid-feed direct methanol fuel cells (DMFCs) has been developed, based on multiphase-mixture model formulation. Experimental data for validation of the model was taken from the published literatures. Developed model shows good agreement on cell performance with experimental data.

Employing present model, the effect of membrane thickness is investigated to evaluate the relation between PEM thickness and methanol crossover, which critically decrease the DMFC performance. Different simulations were performed using Nafion 112, 115 and 117. From the results, the methanol crossover is reduced with increase of PEM thickness, which enhances the cell performance.