

Computational Fluid Dynamics Modeling of polymer electrolyte fuel cells and Parametric Study  
- the effect of operating pressure -

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A three-dimensional mathematical model for polymer electrolyte fuel cells was developed in order to analyze physical and electrochemical phenomena using Computational Fluid Dynamics (CFD) technique. The numerical model was validated against the experimental data of average polarization curve under 100% humidified conditions for 2.5/2.0 and 2.5/3.0 anode/cathode stoichiometry ratios, respectively. In the study, we mainly focus on performance of fuel cell system in accordance with its various operating pressure: 1 atm, 1.5 atm and 2 atm. From the results, the performance of the fuel cell improves with the increase of pressure. The overall polarization curves shift positively as the pressure increases. The reason for the improved performances is the partial pressure increase of the reactant gases with increasing operating pressure.