

عنوان مقاله:

An analytical model to predict the species transport effects on the performance of the PEMFC

محل انتشار:

اولین همایش بین المللی نانو تکنولوژی در فرآیندهای مهندسی (سال: 1402)

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خلاصه مقاله:

PEMFC) The Polymer Electrolyte Membrane Fuel cell is one of the promising candidates for the future energysupply. So, the prediction of the transport) phenomena iscrucial to enhance its performance. The mathematicalbasedmodels can simulate the phenomena easily and inthe fastest time. Also, analytical models can providemuch more accurate and reliable results. In the presentstudy, an innovative analytical approach based on theperturbation method is proposed. The governingequations which consist of the continuity, momentum,species, and energy equations are solved analytically byusing the regular perturbation method. The perturbationparameter is the function of the penetration velocity. Inthe PEMFC, the penetration velocity can be increased byincreasing the GDLs porosity and operating pressure ofthe PEMFC. The solution showed that by increasing theperturbation parameter, the diffusion of the reactanttoward the gas channel to the Gas Diffusion Layer isincreased too and this fact leads to the enhancement ofthe performance of the PEMFC. The axial velocityprofile tends to the bottom of the flow channel. This facthelps the reactant to transfer into the reaction area easily.All of the achieved results are compared to the numericalresults in the same condition which have very good. accordance

کلمات کلیدی:

.PEMFC, Performance, Perturbation method,Analytical solution, Species distribution

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