عنوان مقاله:

Nanofluid Flow in a Semi-porous Channel in the Presence of Uniform Magnetic Field

محل انتشار:

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خلاصه مقاله:

In this paper, the problem of laminar nanofluid flow in a semi-porous channel is investigated analytically using Homotopy Perturbation Method (HPM). This problem is in the presence oftransverse magnetic field. Here, it has been attempted to show the capabilities and wide-range applications of the Homotopy Perturbation Method in comparison with the numerical method used for solving such problems. The fluid is water containing copper as nanoparticle. The effective thermalconductivity and viscosity of nanofluid are calculated by the Maxwell–Garnetts (MG) and Brinkmanmodels, respectively. The obtained solutions, in comparison with the out of the numeric methods admit a remarkable accuracy. A clear conclusion that can be drawn from the results of the numerical method (NM) is that the said method provides high accurate solutions for nonlinear differential equations.Then, we consider the influence of the three dimensionless numbers: the nanofluid volume friction, Hartmann number for the description of the magnetic forces and the Reynolds number for the dynamic forces. Finally, results and discussions appear at the end. The results show that the velocity boundarylayer thickness decreases with increasing Reynolds number and nanoparticle volume friction, and it increases while Hartmann number increases.

کلمات کلیدی:

Nanofluid,Laminar Flow,Semi-porous Channel,Uniform Magnetic,Homotopy Perturbation Method (HPM