



Boundary-layer non-Newtonian flow over vertical plate in porous medium saturated with nanofluid

F. M. HADY¹, F. S. IBRAHIM, S. M. ABDEL-GAIED², M.R.EID²

Abstract:

The free convective heat transfer to the power-law non-Newtonian flow from a vertical plate in a porous medium saturated with nanofluid under laminar conditions is investigated. It is considered that the non-Newtonian nanofluid obeys the mathematical model of power-law. The model used for the nanofluid incorporates the effects of Brownian motion and thermophoresis. The partial differential system governing the problem is transformed into an ordinary system via a usual similarity transformation. The numerical solutions of the resulting ordinary system are obtained. These solutions depend on the power-law index n , Lewis number Le , buoyancy-ratio number Nr , Brownian motion number Nb , and thermophoresis number Nt . For various values of n and Le , the effects of the influence parameters on the fluid behavior as well as the reduced Nusselt number are presented and discussed

Keywords:

non-Newtonian, free convection, nanofluid, porous media

Published In:

Applied Mathematics and Mechanics (English Edition) , 32(12), , 1577-1586