

Effects of Variable Properties and Double Dispersion on Magnetohydrodynamic (MHD) Mixed Convection in a Power-Law Fluid Saturated Non-Darcy Porous Medium

Authors : Pranitha Janapatla, Venkata Suman Gontla

Abstract : The present paper investigates the effects of MHD, double dispersion and variable properties on mixed convection flow from a vertical surface in a power-law fluid saturated non-Darcy porous medium. The governing non-linear partial differential equations are reduced to a system of ordinary differential equations by using a special form of Lie group transformations viz. scaling group of transformations. These ordinary differential equations are solved numerically by using Shooting technique. The influence of relevant parameters on the non-dimensional velocity, temperature, concentration for pseudo-plastic fluid, Newtonian and dilatant fluid are discussed and displayed graphically. The behavior of heat and mass transfer coefficients are shown in tabular form. Comparisons with the published works are performed and are found to be in very good agreement. From this analysis, it is observed that an increase in variable viscosity causes to decrease in velocity profile and increase the temperature and concentration distributions. It is also concluded that increase in the solutal dispersion decreases the velocity and concentration but raises the temperature profile.

Keywords : power-law fluid, thermal conductivity, thermal dispersion, solutal dispersion, variable viscosity

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