



-Effect of Suction/Injection on Natural Convective Boundary Layer Flow of A Nanofluid Past A Vertical Porous Plate Through A Porous Medium

Hady, F. M., Ibrahim, F. S., El-Hawary, H. M. H. and Abdelhady, A. M.

Abstract:

In the present work, an analysis has been carried out to study a problem of natural convection past a vertical porous plate, in a porous medium saturated by a nanofluid with the streamwise distance x . The employed mathematical model for the nanofluid takes into account the effects of Brownian motion and thermophoresis. The Darcy model is employed for the porous medium. Non-similar solution has been obtained. This solution depends on a Lewis number Le , a buoyancy-ratio number Nr , a Brownian motion number Nb and a thermophoresis number Nt . The variation of the reduced Nusselt number with Nr , Nb and Nt is expressed by correlation formulas. The dependency of the Nusselt number on these four parameters and the effect of suction and injection are investigated graphically. It is shown that the inclusion of a nanoparticle into the base fluid of this problem is capable to change the flow pattern.

Keywords:

Natural convection; nanofluid; nonsimilar solution; porous medium; suction; injection

Published In:

Journal of Modern Methods in Numerical Mathematics , Vol. 3, No. 1 , pp. 53-63