

Mixed convection over a horizontal circular cylinder embedded in porous medium immersed in a nanofluid with convective boundary conditions at lower stagnation point: A numerical solution

Norhafizah Md Sarif^{a,}, Mohd Zuki Salleh^a, and Roslinda Nazar^b*

^a Faculty of Industrial Sciences & Technology, Universiti Malaysia Pahang, Lebuhraya Tun Razak, 26300 Gambang, Kuantan, Pahang, Malaysia

^b School of Mathematical Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia

ABSTRACT

This study aims to examine the effect of governing parameters on the flow and heat transfer of the steady mixed convection flow embedded in porous medium with convective boundary conditions. The resulting system of nonlinear partial differential equations is solved numerically. The special case at the lower stagnation point of the cylinder is observed and the case where bottom surface of the cylinder is heated by convection from hot fluids is considered. Numerical solutions are obtained for the velocity, temperature and nanoparticle volume fraction profiles for two values of governing parameters namely convective parameter γ and Lewis number Le . It is found that as the convective parameter γ increases, velocity profile, temperature and nanoparticle volume fraction profile also increases.

KEYWORDS:

Mixed convection; Horizontal circular cylinder; Porous