

Unsteady free convective flow of a hybrid nanofluid past an infinite vertical plate in the presence of radiation with heat and mass transfer

P. Loganathan and A. Mubeen Begum

Department of Mathematics, Anna University, Chennai-600 025, Tamil Nadu, India.

Abstract: This research study scrutinizes the combined effect of Heat and Mass transfer on unsteady free convective flow of a hybrid nanofluid past an infinite vertical plate with the occurrence of radiation. In this study four types of nanofluid, namely Aluminium oxide Al_2O_3 , Copper Cu , Titanium oxide TiO_2 and Silver Ag are considered with water as base fluid. The behaviour of water, nanofluid and hybrid nanofluid with nano particle volume fraction range ($0 \leq \varphi \leq 0.04$) is been considered. The dimensionless coupled linear partial differential equations are solved using Laplace transform approach. Analytical as well as graphical result are obtained for velocity, temperature and concentration profile for selected values of parameters such as nanoparticle volume fraction φ , thermal Radiation parameter R , thermal Grashof number Gr , mass Grashof number Gc , Schmidt number Sc , Prandtl number Pr and dimensionless time t . Also, The effect of skin friction and Nusselt number are explored graphically.

Keywords: *Infinite vertical plate, Heat transfer, Mass transfer, radiation, hybrid nanofluid.*