HEAT AND MASS TRANSFER ANALYSIS ON FLOW OF WILLIAMSON NANOFLUID WITH THERMAL AND VELOCITY SLIPS: BUONGIORNO MODEL

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ABSTRACT

A numerical study is carried out to solve the heat and mass transfer analysis on flow of williamson nanofluid with thermal and velocity slips. The Buongiorno model is used to explore the heat transfer phenomena due to Brownian motion and thermophoresis. Using similarity transformations variables, the governing equations are reduced to a nonlinear ordinary differential equations (ODEs). These equations are then solved numerically via the Runge-Kutta Fehlberg Fourth-Fifth (RKF45) method. The outcomes of velocity slip parameter, thermal slip parameter, Williamson parameter, Prandtl number, heat capacitance ratio parameter, Lewis number, diffusivity ratio parameter and Schmidt number on velocity, temperature and concentration profiles are illustrated graphically and discussed. The results have revealed that the concentration profile decreases as the velocity slip and thermal slip factor parameters are increased. In addition, temperature and concentration are enhanced with the rise in Williamson parameter. The temperature profile is decreased as Lewis and Prandtl numbers are increased.

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