Thermal Radiation Effect on MHD Flow and Heat Transfer of Williamson Nanofluids over a Stretching Sheet with Newtonian Heating

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ABSTRACT

In this paper, the boundary layer magnetohydrodynamics (MHD) flow of Williamson nanofluids over a stretching sheet with Newtonian heating in the presence of thermal radiation effect is analyzed. Using a similarity transformation, the governing equations are reduced to a set of nonlinear ordinary differential equations (ODEs). These equations are solved numerically using a shooting method. The effects of Williamson parameter, magnetic parameter, radiation parameter, Prandtl number, Lewis number, Schmidt number, heat capacities ratio, thermophoretic diffusivity and conjugate parameter on velocity, temperature and concentration fields are shown graphically and discussed. It is found that the rate of heat transfer is higher for Williamson nanofluids compared to the classical viscous fluid. Also, the comparisons with existing results are provided in the literature.