Unsteady water functionalized oxide and non-oxide nanofluids flow over an infinite accelerated plate

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ABSTRACT

The purpose of this communication is to examine the collective influence of heat and mass transfer on magnetohydrodyanmics (MHD) water functionalized oxide or non-oxide nanofluid flows through porous medium together with thermal radiation and chemical reaction effects. The Newtonian heating on the accelerated wall in the presence of different nanoparticles is considered first time and not explored in earlier investigations. To calculate the temperature and velocity fields, the Maxwell model for effective thermal conductivity with relatively large particles is used. Three types of base fluids namely water, kerosene and engine oil containing different types of oxide and non-oxide nanoparticles are taken for this study. Analytic solutions of the governing equations are obtained with the help of Laplace transform method (LTM). Some important cases such as free convection and motion of plate with variably accelerated, constant accelerated, uniform velocity as well as in the absence of free convection are obtained. Graphs are plotted to analyse the characteristics of different involved parameters on velocity, temperature and concentration.

KEYWORDS

Chemical reaction; Nanofluids; Maxwell model; Thermal radiation; Exact solutions

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