MIXED CONVECTION FLOW OF DUSTY VISCOELASTIC WITH ALIGNED MAGNETIC FIELD OVER A VERTICAL STRETCHING SHEET

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ABSTRACT

Viscoelastic fluid is categorized under non-Newtonian fluids. Dusty viscoelastic fluid, which combine elastic, viscous properties and suspended particles are crucial for understanding complex fluid dynamics and useful in fields like blood flow and food processing. Previous studies mainly focused on single-phase fluid flow, but this research investigates two-phase flow, where fluid and dust particles are mixed. Magnetic fields and mixed convection are also considered. In this study, the numerical study of two-phase mixed convection flow of dusty viscoelastic with aligned magnetic field over a vertical stretching sheet is investigated. The primary objective of this study is to introduce a two-phase model of dusty viscoelastic fluid under the influence of aligned magnetic field and mixed convection over a vertical stretching sheet. The velocity and temperature profiles are examined over various parameters including viscoelastic parameter, aligned angle parameter, magnetic field parameter, fluid-particle interaction parameter, Prandtl number and buoyancy parameter. The governing boundary layer partial differential equations (PDEs) are transformed into ordinary differential equations (ODEs) using similarity transformation variables. These ODEs are then solved numerically by using RKF45 method via MAPLE Software. A good conformity of the current results has been achieved after comparing with previous literature studies. Hence, validating the developed numerical algorithm and graphical outputs. The results indicate that as the viscoelastic parameter increases the velocity of both the fluid and dust phases increases, while the temperature profile for both phases are decreased.

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