Convective flow of rotating MHD second grade fluid over an oscillating plate in a porous medium

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Abstract.

In this research, the analytical solutions for unsteady free convection flow of rotating second grade fluid over an isothermal oscillating vertical plate are gained. The influence of Magnetohydrodynamics (MHD) flow is also deliberated in a porous medium. The governing equation for momentum is sculpted in a rotating system such that both fluid and plate revolve in unison with uniform angular velocity. The phenomenon is sculpted in the froth of partial differential equation unruffled in the preliminary and boundary condition. Some appropriate non-dimensional variable are familiarized. The analogous non-dimensional momentum and energy equations with conditions are deciphered via Laplace transform technique. Expressions for velocity and temperature fields are found and demonstrated graphically for dissimilar values of second grade fluid (a), rotation (b), magnetic (M) and porosity (k) parameters. End result acquired gratified all the initial and boundary conditions.

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INTRODUCTION

There are three states of matter i.e., solids, liquids and gases, but in fluid mechanics, liquid and gases both termed as fluids. The difference between the two is their reception to imposed tangential stress. A solid can dissent a shear stress by a stable contortion, whereas a fluid cannot resist such stress. A fluid distort ceaselessly by shear stress, discharging how small it personifies. A liquid has substantial united forces and relatively intimately dense particles to hold back their intensity as equated to the gas molecules and a free surface will be figured out in a gravitational domain if it is not confined from above. They configure an essentially hydrostatic ambiance and thus cannot for a gratuitous surface like liquids are seldom afflicted with gravitational forces besides the force of buoyancy. Fluids are categorized into Newtonian and non-Newtonian fluids. Newtonian fluids obey Newton law of viscosity into which fall all gases and most liquids such as water, benzene, glycerin, silicone oils, sugar solutions, light hydrocarbon oils and so on. Non _Newtonian fluids are complain assortments, for instant, ketchup, slurries, gelatins, mousses, and polymeric solutions and so on and so forth. Thus, fluids are sorted by their viciousness i.e. viscosity is the canonical and leading dimension of a fluid which tarces its type. The viscosity of fluids is mensuration of their resistance to distortion.