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On magnetohydrodynamic flow of nanofluid due to a rotating disk with slip effect: A numerical study

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Abstract: This communication explores the magnetohydrodynamic (MHD) boundary layer flow of viscous nanofluid in the presence of velocity slip condition. The flow is generated due to a rotating disk. Fluid is electrically conducted subject to transverse magnetic field. The induced magnetic field is ignored for a low magnetic Reynolds number. The nanofluid model exhibits the characteristics of Brownian motion and thermophoresis. Problem formulation is carried out for low magnetic Reynolds number and boundary layer assumptions. Suitable transformations are employed to reduce the partial differential system into the nonlinear ordinary differential system. The governing nonlinear ordinary differential system is solved numerically through the bvp4c technique. Effects of various interesting parameters on the velocities, temperature and concentration profiles are sketched and discussed. Further the numerical values of local Nusselt and Sherwood numbers are computed and examined.

Keywords: Rotating disk; Magnetic field; Nanoparticles; Velocity slip; Numerical solution.

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