Heat and mass transfer of an unsteady second grade nanofluid with viscous heating dissipation

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Abstract

This study presents the boundary layer flow of second grade fluid in a rotating reference frame. The resulting system is solved numerically using the bivariate spectral quasi-linearization method to obtain the velocity, temperature and the concentration profiles. We investigate the effects of measurable quantities such as the rate of rotation, thermal diffusivity, energy dissipation, viscoelastic parameter and other material properties of the fluid on the flow. The results show that slow rotation of the frame gives a quick decline in the thicknesses of the momentum, thermal and concentration boundary layers. There is also a region of reverse mass and heat flow for fluids with high Prandtl number.

Keywords: **second grade fluid, nanofluid, rotating frame, bivariate quasi-linearization method.**