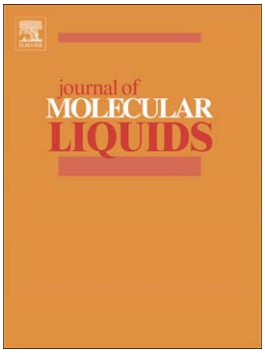

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Enhanced heat transfer in the flow of dissipative non-Newtonian Casson fluid flow over a convectively heated upper surface of a paraboloid of revolution

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Abstract

An analysis is carried out on Casson fluid flow embedded with magnetic nanoparticles. The flow is assumed to be over an upper surface of paraboloid of revolution. The effects of viscous dissipation and nonlinear thermal radiation are considered. Convective boundary conditions are supposed. Fe_3O_4 nano particles are mixed with Casson fluid. In most of the research articles related to MHD nanofluid/ferrofluid flows authors are not taking into consideration the electrical conductivity of base fluid and solid particles. But in the present study the electrical conductivity of Fe_3O_4 and H_2o is also accounted. The transformed governing equations with adequate similarity variables are solved by means of an effective R-K-F integration scheme. The impacts of a few selected parameters on the usual profiles (thermal and velocity) are inspected comprehensively with the aid of plots. Numerical treatment for reduced Nusselt number and wall friction is depicted in tabular form. Results enable us to state that mounting values of temperature ratio or Eckert number accelerates the fluid temperature. A better heat transfer performance on the Casson ferrofluid is perceived when compared to that of Casson fluid.

Keywords: Magnetohydrodynamic (MHD), Casson fluid, ferrofluid, convection, dissipation.