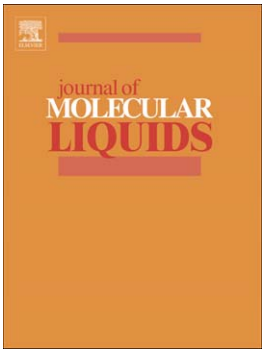

Free convective heat and mass transfer of MHD non-Newtonian nanofluids over a cone in the presence of non-uniform heat source/sink

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Free convective heat and mass transfer of MHD non-Newtonian nanofluids over a cone in the presence of non-uniform heat source/sink

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Abstract

This is a theoretical investigation on the Brownian motion and thermophoresis effects on the flow, heat and mass transfer in magnetohydrodnamic Jeffrey, Maxwell and Oldroyd-B nanofluids over a cone in the presence of non-uniform heat source/sink effects and variable magnetic fields. The transformed systems of nonlinear ordinary differential equations are solved numerically. Buongiorno's two-component heterogeneous model is used for the nanofluids in the hypothesis that nanoparticles have slip velocity relative to the base fluid, originating from the Brownian motion and thermophoresis. The effects of various non-dimensional governing parameters on the flow, heat and mass transfer are discussed with the help of graphs and tables. A good agreement is obtained between the present results and the ones exist in literature. It is observed that Maxwell nanofluid is highly influenced by the magnetic field while compared with the Jeffrey and Oldroyd-B nanofluids. In addition, the non-uniform heat source/sink parameter acts like a major controlling parameter of the nanofluid flow and heat transfer rate. Furthermore, the heat transfer rate of Jeffrey nanofluid is significantly stronger than the one of Oldroyd-B and Maxwell nanofluids.

Keywords: MHD, Nanofluid, Jeffrey fluid, Maxwell fluid, Oldroyd-B fluid, Brownian motion and Thermophoresis.