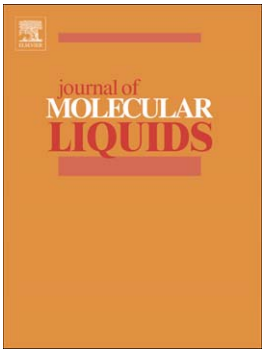

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Computational Analysis of Engine-oil Based Magnetite Nanofludic Problem Inspired with Entropy Generation

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Abstract: This article is a numerical investigation of ferrous-ferric oxide nanoparticles suspended nanofluid in existence of induced magnetic field over an elongating stretching surface. In order to examine efficiency in sense of improved thermal conductivity two mostly encountered fluids i.e., Ethylene glycol and engine oil are taken into the account. Highly nonlinear coupled system of partial differential equations is transformed into nonlinear coupled ordinary differential equations. Keller box technique based on finite differencing is used for computations. Results for influence of physical parameters on velocity, temperature and induced magnetic fields are displayed and discussed. Entropy generation analysis is carried out for comparative analysis. It is concluded that Ethylene glycol based magnetite nanofluid have better results than engine oil based magnetite nanofluid.

Keywords: Stagnation point; Nanoparticles; Induced magnetic field; Entropy generation; Keller box method; Computational design

1 Introduction

Stagnation point flow over stretching surfaces have been a topic of prevalent study because of their broad scientific and engineering applications such as in study of biological fluids in presence of constant magnetic field as well as induced magnetic field, manufacturing of food, paper, glass fiber and purification of crude oil etc. The basic idea of two dimensional stagnation point flow is introduced by Hiemenz [1]. Gorla [2] discussed stagnation point flow with transverse magnetic field. The idea of heat convection of magnetic disks and sills in two phase fluid in presence of layered porous medium driven is given by Polyansky et al. [3]. Ali et al. [4] considered induced magnetic effect on a stagnation point flow with heat transfer phenomenon. Heat transfer effect in stagnation-point flow towards an exponentially shrinking sheet is investigated by Bhattacharyya and Vajravelu [5]. Some

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