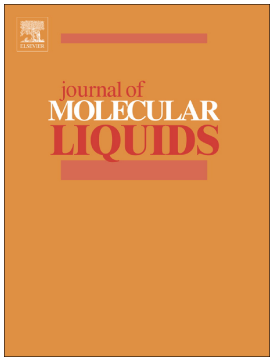

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Shape Effects of MoS_2 nanopartilces on MHD Slip Flow of Molybdenum Disulphide Nanofluid in a Porous Medium

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Abstract:

Magnetohydrodynamic (MHD) mixed convection channel flow of Molybdenum disulphide (MoS_2) nanofluid inside vertical porous medium is investigated. Molybdenum disulphide nanoparticles are used in water as based fluid. Fluid slips at the lower wall of the channel. Molybdenum disulphide as solid nanoparticles are used in different shapes such as platelet, blade, cylinder, brick and spherical. The governing equations are modeled and then solved analytically using perturbation technique. Approximate solutions are obtained for velocity and temperature profiles. Graphical results are obtained through a computational software Mathcad and discussed for various embedded parameters. A comparative study for different shapes of molybdenum disulphide nanoparticles is provided graphically. It is found that MoS_2 nanoparticles with blade and platelet shapes have shown the highest heat transfer rate compared to cylinder and brick shapes. Porosity and magnetic parameters have shown opposite effects on velocity, whereas velocity has shown increase with increasing slip.

KEYWORDS: Molybdenum disulphide (MoS_2) nanoparticles; magnetic field; mixed convection; slip flow; porous medium; shape of nanoparticles.

1.0 Introduction

Molybdenum disulfide (MoS_2) is an inorganic compound classified as a metal dichalcogenide, an alternate layer of molybdenum and sulfur atoms. It is a silvery black solid that occurs as the mineral molybdenite. It is widely used as a solid lubricant because of its low friction properties and robustness. MoS_2 is relatively unreactive and is unaffected by dilute acids and oxygen. Each molybdenum atom is sandwich between trigonal prisms of sulfur atoms in a