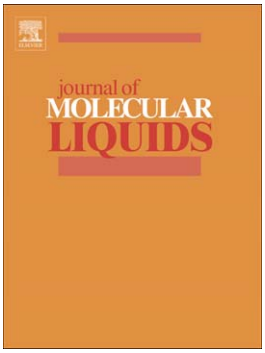

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Numerical Investigation of Nanofluidic Transport of Gyrotactic Microorganisms Submerged in Water towards Riga Plate

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Abstract: This article is an investigation on effect of heat convection on nanofluid flow over a moving Riga plate of variable thickness. In the present study motile density of gyrotactic microorganisms submerged in nanofluid is also examined under the influence of bio convection, mass flux and heat convection. The physical problem is mathematically modeled and obtained nonlinear system of partial differential equation. The obtained highly nonlinear system of coupled partial differential equations is converted into ordinary differential equations using suitable transformation. The highly nonlinear system is tackled numerically by means of implicit finite difference scheme Keller Box. Emphasis is given to the nanofluidic transport towards Riga plate in presence of heat convection and mass flux condition. Influence of meaningful physical parameters of interest are examined and studied on fluid velocity, nanoparticle temperature and concentration along with motile microorganism density graphically. Reliability and efficiency of presented numerical scheme is validated by comparative tables. It is concluded that nanofluid velocity is an increasing function of microorganism concentration and modified magnetic parameter while it seems to decrease with increase in buoyancy ratio, Grashof number and wall thickness.

Keywords: Bioconvection nanoparticles; Gyrotactic Microorganisms; Nanofluidic transport; Riga plate; Keller Box Scheme.

1 Introduction

Newtonian and non-Newtonian fluid flow towards stretching surfaces has opened new horizon of research after Crane [1] because of their useful applications in almost every area of industry and engineering science. Industrial applications include petroleum, paper and glass-fiber production, lubricants and suspension solutions etc. Moreover aerodynamic extrusion of plastic sheets, metal cooling and spinning and many more processes can be seen

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