

Heat and mass transmission of an Oldroyd-B nanofluid flow through a stratified medium with swimming of motile gyrotactic microorganisms and nanoparticles

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Abstract

This paper focuses on the research of motile microorganism rates in the bioconvective Oldroyd-B nanofluid flow over a vertical stretching sheet with mixed convection and inclined magnetic field. Additionally, interesting characteristics of thermophoresis, Brownian motion, viscous dissipation, Joule heating, and stratification are examined. Similarity transformations are employed to reduce the mathematical model to higher-order ODE. The convergent series solution is applied to solve the nonlinear differential system. The analysis of temperature, velocity, motile microorganisms' density, and nanoparticle concentration are represented through graphs. Local Nusselt number, density number of motile microorganisms, and Sherwood number are examined via contour plots.

Palabras clave

Bioconvection, Gyrotactic microorganisms, Oldroyd-B nanofluid, Stratification, inclined magnetic field.

