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Effects of cross- diffusion and radiation on magneto free forced convective stagnation flow from a vertical surface in porous media with Gyrotactic Microorganisms.

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Abstract

In this paper the Soret and Dufour effects on steady free forced convective boundary layer flow about a vertical surface embedded in porous medium subjected to a magnetic field containing gyrotactic microorganism is studied. The governing momentum, energy, concentration and microorganism equations are transformed into a set of coupled differential equations where entire range of forced free convection illustrated by a mixed convection parameter. The obtaining equations are solved by MAPLE 14.0 algorithm and the numerical result for different values of Soret number, Dufour number, Lewis number Le , bioconvection Lewis number Lb , bioconvection Peclet number Pb , Hartmann number, thermal radiation parameter and buoyancy numbers is presented graphically for both assisting and opposing flow. Comparisons are made with available published results as special cases to validate numerical data and excellent compatibility is found. The effects of physical parameters on Nusselt number, Sherwood number and density of motile microorganism are also presented. It is observed that diffusion thermo and thermal diffusion effects on temperature, concentration and microorganisms profile distributions are quite opposite.

Keywords

Soret and Dufour effect, free forced convection, Hartmann number, thermal radiation, gyrotactic microorganisms