

Free convection flow over a vertical flat plate in nanofluid porous media containing gyrotactic microorganisms with prescribed density motile microorganisms flux / A. Mahdy

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Abstrak

ABSTRACT

Our present investigation aimed to examine the natural convection boundary layer flow of nanofluids over a vertical flat plate embedded in a saturated Darcy porous medium containing gyrotactic microorganisms. For carrying out the numerical solution, two steps are performed. The governing partial differential equations are firstly simplified into a set of highly coupled nonlinear ordinary differential equations by suitable similarity variables, and then numerically solved by applying the cubic spline collocation technique. The obtained similarity solution depends on non-dimensional parameters, i.e., the bioconvection Lewis number, bioconvection Rayleigh number, bioconvection Peclet number, Brownian motion parameter, the Buoyancy ratio, the thermophoresis parameter, the power-law variation index, and the Lewis number. A comprehensive numerical computation is carried out for various values of the parameters that describe the flow characteristics. Rescaled velocity and temperature distributions are found to be depending strongly on the bioconvection Rayleigh number and power-law variation index parameter. For making the result more reliable a comparison has been shown in the present work with existing results for some special values of governing parameters and the results are found to be in excellent accuracy.