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Influence of Convective Boundary Condition on Chemically Reacting Micropolar Fluid Flow over a Truncated Cone Embedded in Porous Medium

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Abstract : This article analyzes the mixed convection flow of chemically reacting micropolar fluid over a truncated cone embedded in non-Darcy porous medium with convective boundary condition. In addition, heat generation/absorption and Joule heating effects are taken into consideration. The similarity solution does not exist for this complex fluid flow problem, and hence non-similarity transformations are used to convert the governing fluid flow equations along with related boundary conditions into a set of nondimensional partial differential equations. Many authors have been applied the spectral quasi-linearization method to solve the ordinary differential equations, but here the resulting nonlinear partial differential equations are solved for non-similarity solution by using a recently developed method called the spectral quasi-linearization method (SQLM). Comparison with previously published work on special cases of the problem is performed and found to be in excellent agreement. The effect of pertinent parameters namely, Biot number, mixed convection parameter, heat generation/absorption, Joule heating, Forchheimer number, chemical reaction, micropolar and magnetic field on physical quantities of the flow are displayed through graphs and the salient features are explored in detail. Further, the results are analyzed by comparing with two special cases, namely, vertical plate and full cone wherever possible.

Keywords : chemical reaction, convective boundary condition, joule heating, micropolar fluid, mixed convection, spectral quasi-linearization method
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