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MHD natural convection boundary layer flow of nanofluid over a vertical cone with chemical reaction and suction/injection
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Abstract
In this article we have presented magnetohydrodynamic (MHD) natural convection boundary layer heat and mass transfer flow over a vertical cone embedded in porous medium filled with nanofluid under the enhanced boundary conditions in the presence of thermal radiation, chemical reaction, and suction/injection. The two slip effects, Brownian motion and thermophoresis, are considered in this problem. The governing nonlinear partial differential equations which represent the momentum, energy, and diffusion are transformed into ordinary differential equations with the help of suitable similarity transformations. The transformed conservation equations together with boundary conditions are then solved numerically by using a versatile, extensively validated, variational finite element method. The influences of key parameters such as magnetic field (M), buoyancy ratio parameter (Nr), Brownian motion parameter (N b), thermophoresis parameter (N t), thermal radiation (R), Lewis number (Le), suction (V 0 > 0), or injection (V 0 < 0) parameter and chemical reaction parameter (Cr) on velocity, temperature, and concentration evaluation in the boundary layer region are examined in detail. Furthermore, the effect of these parameters on the local skin-friction coefficient (Cf), local Nusselt number (Nux), and local Sherwood number (Shx) is also investigated. The results are compared with previously published work and found to be in admirable agreement. © 2017 by Begell House, Inc.

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