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Chemical reaction effects on MHD convective heat and mass transfer flow past a rotating vertical cone embedded in a variable porosity regime
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Abstract
An analysis is carried out to study the coupled heat and mass transfer by mixed convection flow of a Newtonian fluid past a rotating vertical cone embedded in a porous medium in the presence of a magnetic field and chemical reaction effects. The cone surface is maintained at variable temperature and concentration. Similarity transformation is employed to transform the governing partial differential equations into a set of nonlinear ordinary differential equations, which are then solved numerically using shooting method that uses Runge-Kutta and Newton's method. Comparisons with previously published work are performed and results are found to be in excellent agreement. Numerical Results for the velocities, temperature, concentration profiles, as well as local tangential and azimuthal skin friction coefficients, local Nusselt and Sherwood numbers are presented graphically and discussed for different values of the governing parameters to show interesting features of the solutions. This type of study finds significant applications in cooling of electric circuits, packed-bed chemical reactors, solar porous wafer absorber systems, synthesis materials and hygroscopic materials. © 2015, African Mathematical Union and Springer-Verlag Berlin Heidelberg.

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