Flow over an Exponentially Stretching Sheet with Hall and Cross-Diffusion Effects

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Abstract : This paper analyzes the Soret and Dufour effects on mixed convection flow, heat and mass transfer from an exponentially stretching surface in a viscous fluid with Hall Effect. The governing partial differential equations are transformed into ordinary differential equations using similarity transformations. The nonlinear coupled ordinary differential equations are reduced to a system of linear differential equations using the successive linearization method and then solved the resulting linear system using the Chebyshev pseudo spectral method. The numerical results for the velocity components, temperature and concentration are presented graphically. The obtained results are compared with the previously published results, and are found to be in excellent agreement. It is observed from the present analysis that the primary and secondary velocities and concentration are found to be increasing, and temperature is decreasing with the increase in the values of the Soret parameter. An increase in the Dufour parameter increases both the primary and secondary velocities and temperature and decreases the concentration.

Keywords : Exponentially stretching sheet, Hall current, Heat and Mass transfer, Soret and Dufour Effects

Conference Title : ICMAE 2016 : International Conference on Mechanical and Aerospace Engineering

Conference Location : London, United Kingdom

Conference Dates : September 29-30, 2016