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International Scientific Journal

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ANALYTIC SOLUTION OF HEAT AND MASS TRANSFER OVER A PERMEABLE STRETCHING PLATE AFFECTED BY CHEMICAL REACTION, INTERNAL HEATING, DUFOUR-SORET EFFECT AND HALL EFFECT

ABSTRACT

The analytical solution is derived for the steady MHD mixed convection, laminar, heat and mass transfer over an isothermal, inclined permeable stretching sheet, immersed in a uniform porous medium in the presence of chemical reaction, thermal radiation, Dufour and Soret effects, an external transverse magnetic field, and internal heating. The governing equations are transformed into a dimensionless coupled system of non-linear ordinary differential equations and then solved analytically by the homotopy analysis method. A parametric study illustrating the influence of the chemical reaction, magnetic field, porous medium inertia parameter, and the Dufour and Soret numbers on the fluid velocity, temperature, and concentration are investigated through the obtained analytic solution. As well as the local Nusselt and the Sherwood numbers is conducted. The obtained results are presented graphically and the physical aspects of the problem are discussed. The obtained solution has been tested numerically for some values of the system parameters. Comparison with previously reported numerical results is tabulated and agreement is recorded. Analytic form of some characteristic parameters, e. g. the local skin-friction coefficient, the local Nusselt number, and the local Sherwood number, stress at the stretching surface, local mass transfer coefficient, the local wall mass flux, the local heat transfer coefficient and the local heat flux, are given due to the obtained analytic solution.

KEYWORDS

[heat and mass transfer](#), [chemical reaction](#), [Soret-Dufore effect](#), [internal heating](#), [permeable stretching sheet](#), [homotopy analysis method](#)

PAPER SUBMITTED: 2008-06-12

PAPER REVISED: 2008-11-26

PAPER ACCEPTED: 2009-02-15

DOI REFERENCE: [TSCI0902183A](#)

CITATION EXPORT: [view in browser](#) or [download as text file](#)

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