HOMOTOPY AANLYSIS TO HEAT AND MASS TRANSFER OF A VISCO-ELASTIC FLUID OVER A MOVING VERTICAL PLATE WITH SUCTION AND VISCOUS DISSIPATION IN A POROUS MEDIUM

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Abstract

This paper aims to present an analytic solution to the steady two dimensional free convective boundary layer flow of viscous, incompressible fluid over a continuous moving vertical porous plate in the presence of suction and viscous dissipation. A similarity transformation is used to convert governing nonlinear partial differential equations into ordinary differential equations. Homotopy analysis method (HAM) has been used to get analytical solutions of nonlinear ordinary differential equations. The convergence of obtained analytical solutions is explicitly discussed. The velocity, temperature and concentration profiles are plotted for various parameters such as suction parameter (F_w), buoyancy parameters (Gr, Gc), permeability parameter (K), Eckert number (Ec) and Schmidt number (Sc). Also, the numerical values of skin friction coefficient, Nusselt number and Sherwood number are obtained for various values of these parameters and presented through tables. The accuracy of our results is shown by giving a comparison of the results with the results already existing in the literature and are seen in good agreement.

Keywords: Viscous dissipation, porous medium, suction, boundary layer flow, homotopy analysis method.