

HEAT AND MASS TRANSFER FOR MHD FLUID FLOW OVER A PERMEABLE VERTICAL STRETCHING SHEET WITH CONSIDERING BUOYANCY FORCES

Mohammad Mehdi Rashidi^{1*}, Behnam Rostami², Navid Freidooni Mehr²

¹ Mechanical Engineering Department, Engineering Faculty of Bu-Ali Sina University, Hamedan, Iran.

² Young Researchers & Elites Club, Hamedan Branch, Islamic Azad University, Hamedan, Iran.

*Correspondence author: Fax: +98 811 8257400 Email: mm_rashidi@yahoo.com

Keywords: Heat and mass transfer; Porous media; HAM; Stretching surface; MHD flow

Section: Natural and forced convection in porous media; Combined heat and mass transfer in porous media

ABSTRACT

The homotopy analysis method (HAM) is employed to examine free convective heat and mass transfer in a steady two-dimensional magneto hydrodynamic fluid flow over a stretching vertical surface in porous medium in this paper. In this study thermal radiation and non-uniform magnetic field are taken into account. The two-dimensional boundary-layer governing partial differential equations are derived with considering Boussinesq and boundary-layer approximations, and the ordinary differential nonlinear forms of momentum, energy and concentration equations are obtained by similarity solution. The high non-linear momentum, energy and concentration equations are solved analytically in the presence of buoyancy forces. The effects of different involved parameters such as magnetic field parameter, suction/injection parameter, Prandtl number, buoyancy parameter, Schmidt number, Biot number and radiation parameter on velocity, temperature and concentration profiles are plotted and discussed in the paper. The effects of nonlinearity in stretching rate and wall concentration have been discussed.