Analysis of MHD mixed convection about a vertical plate embedded in porous medium

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Mixed convection flow with simultaneous heat and mass transfer from different geometries embedded in porous media has many engineering and geophysical applications such as geothermal reservoirs, drying of porous solids, thermal insulation, enhanced oil recovery, packed-bed catalytic reactors, cooling of nuclear reactors and underground energy transport. In this paper, mixed convective boundary layer flow past a vertical porous plate embedded in a saturated porous medium with a constant heat flux and mass transfer in the presence of a magnetic field is investigated. Using the Boussinesq and boundary-layer approximations, the fluid equations for momentum, energy balance and concentration governing the problem are formulated. These equations are solved numerically by using the most effective Newton-Raphson shooting method along with fourth-order Runge-Kutta integration algorithm. The results reveal among other things that for positive values of the buoyancy parameters, the skin friction increased with increasing values of Eckert number (Ec) and magnetic field intensity parameter (M) and decreased with increasing values of Schmidt number (Sc) and permeability parameter (K).