2017

Double-diffusive mixed convection boundary layer flow over a wedge in a porous medium with cross-diffusion effects

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Master of Science (Mathematical Modeling)

University of Dar es Salaam, College of Natural and Applied Sciences, 2017

The study investigates a double-diffusive mixed convection boundary layer flow over a wedge in a porous medium with cross-diffusion effects. The governing non-linear Partial Differential Equations (PDEs) are transformed into a system of dimensionless nonlinear Ordinary Differential Equations (ODEs) using an appropriate similarity variable. The system of non-linear ODEs together with their respective boundary conditions is solved numerically. The velocity, temperature and concentration profiles were determined and shown graphically for various selected flow parameters. Subsequently, the skin friction, Nusselt and Sherwood numbers were reported in a tabular form. The findings reveal that, wedge angle, buoyancy forces and permeability parameters have significant effects on increasing velocity and reducing both temperature and concentration profiles, as well as increasing heat and mass transfer rates from the wedge surface. However, the cross-diffusion effect which is contributed by Dufour and Soret parameters, tend to reduce heat and mass transfer rates over the wedge, these results hinder cooling of the wedge surface.