

Documents

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Computation of unsteady mhd mixed convective heat and mass transfer in dissipative reactive micropolar flow considering solet and dufour effects
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Abstract

In the current paper, a finite element computational solution is conducted for MHD double diffusive flow characterizing dissipative micropolar mixed convective heat and mass transfer adjacent to a vertical porous plate embedded in a saturated porous medium. The micropolar fluid is also chemically reacting, both Soret and Dufour effects and also heat absorption included. The governing partial differential equations for momentum, heat, angular momentum and species conservation are transformed into dimensionless form under the assumption of low Reynolds number with appropriate dimensionless quantities. The emerging boundary value problem is then solved numerically with an efficient computational finite element method employing the weighted residual approach. The influence of various emerging physical parameters like thermal Grashof number, solutal Grashof number, Magnetic body force parameter, permeability parameter, radiation parameter, heat absorption parameter, Eckert number, Schmidt number, Soret and Dufour effects and first order chemical reaction parameter are examined, we observed that the microrotation velocity profiles do not show uniform variations with Eringen vortex viscosity parameter and graphical results visualize the velocity of a Newtonian fluid is lower as compared with a micropolar fluid one. Furthermore, finite element code is benchmarked with the results reported in the literature to check the validity and accuracy under some limiting cases and excellent agreement is seen with published solutions. Finally, results of skin friction coefficient, couple stress coefficient, Nusselt number and Sherwood number for invoked parameter are tabulated which shows that Sherwood number is enhances with increasing Soret number and homogeneous chemical reaction. Nusselt number is increased with an increase of Eckert number and Dufour number. © 2018, Global Digital Central. All Rights Reserved.

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