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Abstract

A theoretical investigation of the influence of radiation on natural convection flow of an electrically conducting visco-elastic fluid in a vertical channel partially filled by a porous medium with high porosity has been presented. It is assumed that the conducting fluid is gray, emitting-absorbing radiation, and non-scattering medium. The visco-elastic fluid is characterized by Walters liquid (Model B´). The infinite vertical porous plates of the channel are subjected to constant injection and suction velocity respectively. The entire system rotates about the axis normal to the plates with a uniform angular velocity. The perturbation scheme has been used to solve the governing equations of the fluid motion. The approximate solutions for velocity and temperature fields have been derived and the effects of the Prandtl number, Grashof number, radiation-conduction parameter (Stark number), rotation parameter, magnetic field and permeability of the porous medium on the velocity field, temperature field and Nusselt number have been discussed and illustrated graphically in possible cases. The practical use of this problem can be seen in heating of buildings, cooling electronic components and drying several types of agriculture products grain and food.

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Index Terms

Computer Science Applied Sciences

Keywords

Visco-elastic permeability porous medium partially filled Walters liquid (Model B´).