UNSTEADY MHD FREE CONVECTION COUETTE FLOW BETWEEN TWO VERTICAL PERMEABLE PLATES IN THE PRESENCE OF THERMAL RADIATION USING GALERKIN'S FINITE ELEMENT METHOD

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ABSTRACT

This paper investigates the unsteady magneto hydrodynamic natural convection Couette flow of an incompressible viscous fluid in the presence of thermal radiation. A uniform magnetic field which acts in adirection orthogonal to the permeable plates, and uniform suction and injection through the plates are applied. The magnetic field lines are assumed to be fixed relative to the moving plate. The momentum equation considers buoyancy forces while the energy equation incorporates the effects of thermal radiation. The fluid is considered to be a gray absorbing-emitting but non-scattering medium in the optically thick limit. The Rossel and approximation is used to describe the radiative heat flux in the energy equation. The coupled pair of partial differential equations is discretized using the Galerkin finite element method. The resulting system of equations is solved to obtain the velocity and temperature distributions. The effects of suction parameter S, radiation parameter Rd, Grashof number Gr, magnetic parameter H and Prandtl number Pr on both the velocity and temperature distributions are studied.

KEYWORDS: Couette Flow, Finite Element Method, Free Convection, MHD, Thermal Radiation, Vertical Permeable Channel