

OSCILLATORY MHD FREE AND FORCED CONVECTIVE FLOW AND MASS TRANSFER THROUGH A VERTICAL POROUS PLATE IN SLIP-FLOW REGIME WITH VARIABLE SUCTION AND CONSTANT HEAT FLUX

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ABSTRACT

An attempt has been made to study an oscillatory MHD free and forced convective flow past a vertical porous plate in slip-flow regime with variable suction and constant heat flux. The temperature of the plate oscillates in time about a constant mean and a uniform magnetic field is assumed to be applied transversely to the direction of the flow. The magnetic Reynolds number is assumed to be small so that the induced magnetic field can be neglected. The solutions to the governing equations are derived by regular perturbation technique with Eckert number (E) as perturbation parameter.

The expressions for the velocity field, temperature field, skin friction at the plate in the direction of the flow and the plate temperature are obtained in non-dimensional form. The amplitudes and phases of the fluctuating parts of the skin friction and rate of heat transfer (Nusselt Number) are obtained in non-dimensional form. The effects of the Hartmann number (M), the frequency of oscillation(ω), suction parameter(A) and the rarefaction parameter(h) on these fields are discussed and demonstrated with the help of graphs.

KEYWORDS: MHD, Viscous, Oscillatory, Electrically Conducting, Incompressible, Heat Transfer, Slip-Flow, Eckert Number