

Thermal Radiation Effect on Mixed Convection Boundary Layer Flow over a Vertical Plate with Varying Density and Volumetric Expansion Coefficient

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Abstract : In this article, the effect of thermal radiation on mixed convection boundary layer flow of a viscous fluid along a highly heated vertical flat plate is considered with varying density and volumetric expansion coefficient. The density of the fluid is assumed to vary exponentially with temperature, however; volumetric expansion coefficient depends linearly on temperature. Boundary layer equations are transformed into convenient form by introducing primitive variable formulations. Solutions of transformed system of equations are obtained numerically through implicit finite difference method along with Gaussian elimination technique. Results are discussed in view of various parameters, like thermal radiation parameter, volumetric expansion parameter and density variation parameter on the wall shear stress and heat transfer rate. It is concluded from the present investigation that increase in volumetric expansion parameter decreases wall shear stress and enhances heat transfer rate.

Keywords : thermal radiation, mixed convection, variable density, variable volumetric expansion coefficient

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