MECHANICAL ENGINEERING

M.S. DEFENSE

The Department of Mechanical Engineering presents:

The M.S. Defense of Wenlu Shi

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Mixed Convection in an Obstructed Two-Dimensional Open-Ended Cavity

Abstract: Mixed convection in an obstructed cavity with heated horizontal walls is studied numerically. Brinkman-Forchheimer-extended Darcy model is utilized to describe the flow behavior within the porous medium for different angles of attack with respect to the forced convection. Numerical results are obtained for a wide range of Grashof numbers (10^2-10^{13}), Reynolds numbers (10^2-$5\acute{}10^4$), Darcy numbers (10^{-6}-10^{-1}), and aspect ratios (0.25-2). The effects of all of the pertinent physical parameters are investigated in terms of the flow and temperature fields. The presented results show that the Darcy number plays a significant role on the flow and thermal fields for different flow configurations. For an inclined flow; the vertical velocity component is substantially diminished within a narrow entrance section near the inlet boundary. It is shown that as the aspect ratio increases the thickness of the thermal boundary layer increases, resulting in a decrease in the heat transfer rate though the horizontal walls.