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THE INFLUENCE OF HEATING SIDE LENGTH AND CAVITY ORIENTATIONS ON FREE CONVECTION IN A TRAPEZOIDAL ENCLOSURE

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ABSTRACT

In this paper, a convective heat transfer by laminar free convection in a 2D trapezoidal enclosure is carried out using a control volume based numerical procedure. An enclosure is bounded with parallel heating and adiabatic walls, which are connected by uniformly cooled inclined side walls. A numerical study is carried out using the parameters such as Rayleigh number, Ra ($10^3 \leq Ra\ 10^6$), length of the heating side, ε ($0.4L \leq \varepsilon \leq 0.8L$) and orientation of the cavity, ϕ ($+60^0 \leq \phi \leq -60^0$). The heat transfer and fluid flow are predicted by streamlines, temperature contours, local and overall heat transfer rate. It is seen that heat transfer increases with the increase of Ra, side heating length and angle of orientation of the enclosure. The overall heat transfer rate is a function of cavity angle. On the basis of applications, the heat transfer is controlled by choosing appropriate parameters, the average Nusselt number increases with side length. Maximum heat transfer is found to occur at a horizontal position.

KEYWORDS: *Cavity Orientation, Heat Transfer, Heating Length, Natural Convection, Trapezoidal Cavity*