

Numerical Study of Mixed Convection Coupled to Radiation in a Square Cavity with a Lid-Driven

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Abstract : In this study we investigated numerically heat transfer by mixed convection coupled to radiation in a square cavity; the upper horizontal wall is movable. The purpose of this study is to see the influence of the emissivity and the varying of the Richardson number on the variation of the average Nusselt number. The vertical walls of the cavity are differentially heated, the left wall is maintained at a uniform temperature higher than the right wall, and the two horizontal walls are adiabatic. The finite volume method is used for solving the dimensionless governing equations. Emissivity values used in this study are ranged between 0 and 1, the Richardson number in the range 0.1 to 10. The Rayleigh number is fixed to $Ra = 10000$ and the Prandtl number is maintained constant $Pr = 0.71$. Streamlines, isothermal lines and the average Nusselt number are presented according to the surface emissivity. The results of this study show that the Richardson number and emissivity affect the average Nusselt number.

Keywords : mixed convection, square cavity, wall emissivity, lid-driven, numerical study

Conference Title : ICFMHTT 2015 : International Conference on Fluid Mechanics, Heat Transfer and Thermodynamics

Conference Location : Barcelona, Spain

Conference Dates : October 26-27, 2015