

Numerical Study of Laminar Natural Flow Transitions in Rectangular Cavity

Authors : Sabrina Nouri, Abderahmane Ghezal, Said Abboudi, Pierre Spiteri

Abstract : This paper deals with the numerical study of heat and mass transfer of laminar flow transition at low Prandtl numbers. The model includes the two-directional momentum, the energy and mass transfer equations. These equations are discretized by the finite volume method and solved by a self-made simpler like Fortran code. The effect of governing parameters, namely the Lewis and Prandtl numbers, on the transition of the flow and solute distribution is studied for positive and negative thermal and solutal buoyancy forces ratio. Nusselt and Sherwood numbers are derived for of Prandtl [10^{-2} - 10^1] and Lewis numbers [1 - 10^4]. The results show unicell and multi-cell flow. Solute and flow boundary layers appear for low Prandtl number.

Keywords : natural convection, low Prandtl number, heat and mass transfer, finite volume method

Conference Title : ICAMM 2018 : International Conference on Applied Mechanics and Mathematics

Conference Location : Vancouver, Canada

Conference Dates : August 09-10, 2018