Meeting: 998, Houston, Texas, SS 14A, Special Session on Space and Time Decomposition Methods in Computational and Applied Mathematics

998-76-176 **Luis Miguel de la Cruz** (luiggi@ixtli.unam.mx), Direccion General de Computo Academico, 04510 Mexico, DF, Mexico, **Eduardo Ramos*** (erm@cie.unam.mx), Centro de Investigacion en Energia, Ap. P. 43, 62580 Temixco, Mor., Mexico, and **Martin Salinas** (msv@quetzal.iingen.unam.mx), Instituto de Ingenieria, 04510 Mexico, D.F., Mexico. *Laminar and turbulent natural convection in enclosures.*

We describe numerical solutions for natural convection in rectangular enclosures with two opposite vertical walls heated and cooled respectively. The solution is obtained using a library for solving the governing equations of natural convection for Newtonian and incompressible fluids, based on the finite volume method. The pressure coupling is solved with the SIMPLEC method, where a pressure correction equation is used to account for mass conservation. We use regular meshes with up to 128^3 volumes. Performance efficiency is reported for representative cases and validation is made by comparing our results with other numerical simulations and experimental measurements. Turbulent flows are modelled using Large-Eddy Simulation and Selective Structure-Function models for the eddy viscosity, where the eddy viscosity is switched off when the flow is not three-dimensional enough. Qualitative properties of laminar and turbulent solutions are characterized by Rayleigh (Ra) and Prandtl (Pr) numbers. We take Pr=0.71 and Ra$< 10^9$ and our results include velocity, temperature and pressure fields for both regimes and also statistical properties of turbulent flows. It is expected that results presented here can be applied in industrial processes and architectural designs. (Received February 24, 2004)