Title: **Simulating Natural Turbulent Convection Fluid Flow in an Enclosure the Two-Equation Turbulent Models**

Author: **Otieno, Kennedy Otieno**

Abstract: This study assesses the performance of three numerical turbulence models; k - 8, k - 0) and k - 0) - SST in predicting heat transfer due to natural convection inside an air filled cavity. The heat transfer due to natural convection inside a rectangular closed cavity should be modeled to include the effect of turbulence for Rayleigh number greater ti1~1l or equal to 10 9.The non-linear terms uj Uj and u/J in the averaged momentum and energy equations respectively were modeled using the k - 8, k - 0) and k - 0) - SST models to close the governing equations. The cavity is maintained at 283 K on the cold wall and 323 K on the opposite hot wall. The other four walls are adiabatic. The vorticity-vector potential formulation has been used to eliminate the need to solve the pressure term. The vorticity, vector potential, energy and the two-equations for respective models together with their boundary conditions were solved using finite difference approximations. The results obtained for velocity, temperature, Nusselt number and turbulent kinetic energy for the three turbulence models were compared to experimentally determined values. The comparisons showed that k - 0) - SST model performs better than both k - 8 and k - OJ models in the whole enclosure. The k - OJ - SST was then used in a test case problem of heating and eoetmg on the same wall. For the test problem, it has been fuund that the room is stratified into three regions; a cold upper region, a hot region in the area between the heater and window and a warm lower region.