A numerical investigation of turbulent natural convection in a 3-D enclosure using k-wSST model and Simple method

Kimunguyi Kiliswa Josephs, **Grace Wambui Gachigua*** and **Francis Kimani Gatheri***

*Department of Pure and Applied Mathematics, The technical University of Kenya

ABSTRACT

The objective of this study is to conduct a numerical investigation of turbulent natural convection in a 3-Dcavity using the k-ω SST model and the SIMPLEC method. The statistical-averaging process ofthemass,momentum and energy governing equations introduces unknown turbulent correlations into the mean flow equations which represent the turbulent transport of momentum, heat and mass, namely Reynolds stress(□□□□□) and heat flux(□□□□), which are modelled using k-ω SST model. The Reynolds-Averaged Navier-stokes (RANS), energy and k-ω SST turbulent equations are first non-dimensional zed and the resulting equations are discretized using Finite Volume Method and solved using SIMPLEC. From the results, both the experimental data and simulation using SIMPLEC return a non-dimensional temperature of 0.5 at the core of the cavity and almost zero towards the cold and the natural turbulence flow is responsible for temperature distribution.
KEYWORDS: Turbulence, natural Convention, k-ω SST, SIMPLEC Method

International Journal of Engineering Sciences & Research Technology 7 (1), 66-77. (2018)
See more at:
http://www.academia.edu/35629803/A_NUMERICAL_INVESTIGATION_OF_TURBULENT_NATURAL_CONVECTION_IN_A_3-D_ENCLOSURE_USING_K-%CF%89_SST_MODEL_AND_SIMPLEC_METHOD