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

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ABSTRACT

The objective of this study is to conduct a numerical investigation of turbulent natural convection in a 3-D cavity using the k-ω SST model and the SIMPLEC method. The statistical-averaging process of the mass, 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 nondimensionalized 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

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