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Numerical Analysis of Turbulent Natural Convection In A Cavity MOHAMED OMRI, NICOLAS GALANIS, Université de Sherbrooke, Canada — CFD codes are used extensively to analyse complex flow fields with heat and/or mass transfer, chemical reactions, etc.... It is therefore necessary to continuously compare their predictions with experimental values in order to test their validity and eventually improve them. In this work, numerical predictions of turbulent natural convection in a square differentially heated cavity are analysed. Results are confronted to the detailed experimental data of [2] and [1] obtained with a Rayleigh number of $1.5x10^9$. The purpose of this study is to evaluate the capacity of second order models to reproduce mean and fluctuating quantities. Thus, we first analyse mean velocities and mean temperature profiles. Then particular attention is given to turbulent quantities. Also, we compare the local Nusselt number along the four walls with the corresponding experimental values. Moreover five different grids are used (50x50, 100x100x100, 150x150, 200x200 and 300x300) to analyse grid-sensitivity.

[1] Ampofo F.; Karayiannis T.G. (2003). Experimental benchmark data for turbulent natural convection in an air filled square cavity. Int. J. Heat and Mass Transfer.
[2] Tian Y.S.; Karayiannis T.G. (2000) Low turbulence natural convection in an air filled square cavity. Int. J. of Heat and Mass Transfer.

Mohamed Omri
Université de Sherbrooke, Canada

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