Abstract :

The flow structure and heat transfer characteristics of a turbulent axisymmetric jet flowing into a heated cylindrical cavity. It comes to a jet exiting into a cavity with a closed bottom, open to the ambient air upstream. This flow configuration is encountered in several industrial applications such as the cooling system or the ventilation of confined spaces. This problem parameters are: (a) jet exit Reynolds number (Re, based on the nozzle diameter; d) ranged from 20000 to 50000, (b); the non-dimensional distance from the jet exit and the cavity bottom (L_f) between 2 and 8. The Reynolds Stress second order turbulence model coupled to the enhanced wall treatment is used for the numerical predictions. The flow structure interaction between the jet exit and the cavity bottom area is detailed through the velocity profiles. The thermal study was based on the influence of the Reynolds number Re and the impinging distance L_f on the local Nusselt number. The computations agree well with available data. Numerical results show that, both flow and heat transfer was significantly affected by impinging distance and Reynolds number. The distribution of average Nusselt number is correlated according with some problem parameters ($Nu_{avr}=f(Re, L_f)$).