Abstract

Computations of heat transfer and fluid flow of a plane isothermal fully developed turbulent plane jet flowing into a rectangular hot cavity are reported in this paper. Both velocity and temperature distributions are computed by solving the two-dimensional unsteady Reynolds-averaged Navier-Stokes (URANS) equations. This approach is based on one-point statistical modeling using the energy-specific dissipation (k-Ï‰) turbulence model. The numerical predictions are achieved by finite volume method. This problem is relevant to a wide range of practical applications including forced convection and the ventilation of mines, enclosure, or corridors. The structural properties of the flow and heat transfer are described for several conditions. An oscillatory regime is evidenced for particular jet location, inducing for each variable a periodic behavior versus time. The jet flapping phenomena are detailed numerically by the instantaneous streamlines contours and the vorticity magnitude contours within one period of oscillation. The heat transfer along the cavity walls is also periodic. Time average of mean Nusselt number is correlated according with some problem parameters