Experimental and numerical investigations for turbulent air flow characteristics of circular orifice plate

The present work describes the airflow characteristics upstream and downstream of the circular orifice numerically using the standard k-ε model and RSM and experimentally employing hot-wire and Pitot tube devices to measure the flow velocities through a tube. An expectation has to bear in mind; the RSM performed well and predicted results in a good level of agreement against the experimental measurements found in preceding studies and the present experimental data as well. In terms of flow physics point of view, velocity and turbulent kinetic energy distribution are presented. Moreover, turbulent viscosity, Reynolds stresses (u2 , v 2 , w 2) are also considered. Furthermore, the contours of velocity, static pressure and turbulent kinetic energy are presented beside the wall shear stress and y+ profiles are illustrated to show the flow physics as well as to compare the results of two different turbulence models considered in this study employing Reynolds of 30000 and the ratio of orifice diameter to the pipe diameter of 0.5.