

CFD Prediction of the Round Elbow Fitting Loss Coefficient

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Abstract : Pressure loss in ductworks is an important factor to be considered in design of engineering systems such as power-plants, refineries, HVAC systems to reduce energy costs. Ductwork can be composed by straight ducts and different types of fittings (elbows, transitions, converging and diverging tees and wyes). Duct fittings are significant sources of pressure loss in fluid distribution systems. Fitting losses can be even more significant than equipment components such as coils, filters, and dampers. At the present work, a conventional 90o round elbow under turbulent incompressible airflow is studied. Mass, momentum, and k-e turbulence model equations are solved employing the finite volume method. The SIMPLE algorithm is used for the pressure-velocity coupling. In order to validate the numerical tool, the elbow pressure loss coefficient is determined using the same conditions to compare with ASHRAE database. Furthermore, the effect of Reynolds number variation on the elbow pressure loss coefficient is investigated. These results can be useful to perform better preliminary design of air distribution ductworks in air conditioning systems.

Keywords : duct fitting, pressure loss, elbow, thermodynamics

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