

Turbulence Modeling of Source and Sink Flows

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Abstract : Flows developed between two parallel disks have many engineering applications. Two types of non-swirling flows can be generated in such a domain. One is purely source flow in disc type domain (outward flow). Other is purely sink flow in disc type domain (inward flow). This situation often appears in some turbo machinery components such as air bearings, heat exchanger, radial diffuser, vortex gyroscope, disc valves, and viscosity meters. The main goal of this paper is to show the mesh convergence, because mesh convergence saves time, and economical to run and increase the efficiency of modeling for both sink and source flow. Then flow field is resolved using a very fine mesh near-wall, using enhanced wall treatment. After that we are going to compare this flow using standard k-epsilon, RNG k-epsilon turbulence models. Lastly compare some experimental data with numerical solution for sink flow. The good agreement of numerical solution with the experimental works validates the current modeling.

Keywords : hydraulic diameter, k-epsilon model, meshes convergence, Reynolds number, RNG model, sink flow, source flow, wall y+

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