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EFFECT OF PRANDTL NUMBER ON HEAT TRANSFER CHARACTERISTICS IN AN AXISYMMETRIC SUDDEN EXPANSION: A NUMERICAL STUDY

ABSTRACT

Using the standard k-e turbulence model, an incompressible, axisymmetric turbulent flow with a sudden expansion was simulated. Effect of Prandtl number on heat transfer characteristics downstream of the expansion was investigated. The simulation revealed circulation downstream of the expansion. A secondary circulation (corner eddy) was also predicted. Reattachment was predicted at approximately 10 step heights. Corresponding to Prandtl number of 7.0, a peak Nusselt number 13 times the fully-developed value was predicted. The ratio of peak to fully-developed Nusselt number was shown to decrease with decreasing Prandtl number. Location of maximum Nusselt number was insensitive to Prandtl number.

KEYWORDS

[turbulence](#), [Prandtl number](#), [heat transfer](#), [expansion](#)

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