Study of laminar flow and heat transfer in a square channel with 30º inline angled baffle turbulators using OpenFOAM.

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Synopsis

This research migration project aims to do a Study of laminar flow and heat transfer in a square channel with 30 deg inline angled baffle turbulators using OpenFOAM. The geometry and mesh were defined using the `blockMesh` utility. The computations based on the finite volume method with the SIMPLE algorithm (`buoyantSimpleFoam`) have been conducted for the fluid flow in terms of Reynolds numbers ranging from 100 to 2000. The analysis executed by Pongjet Promvonge [1] using a commercial CFD simulator is taken as a reference.
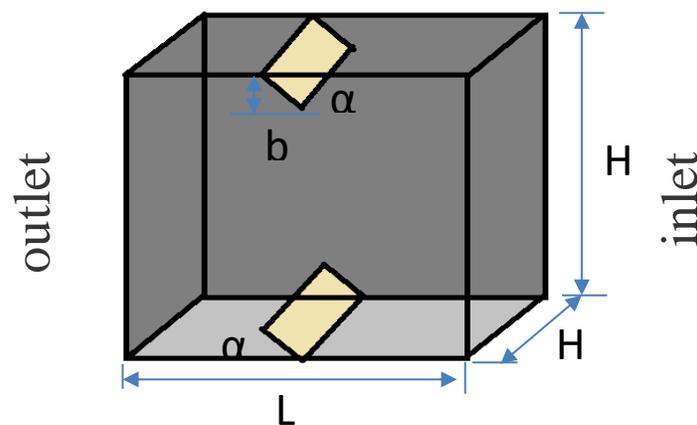

Figure 1: Geometry and Dimensions

The dimensions of the geometry stated in the figure 1 are: H=0.05 m, L=0.05 m, BR = 0.1 &0.2 for PR =1. Flowing fluid is entering from the inlet with a velocity of 0.316 m/s and exiting from the outlet. Fluid properties and boundary conditions are discussed in the report.

Reference

[1] Pongjet Promvonge*, Withada Jedsadaratanachai, Sutapat Kwankaomeng. "Numerical study of laminar flow and heat transfer in a square channel with 30º inline angled baffle turbulators". In: *Applied Thermal Engineering 30 (2010) 1292e1303*. ISSN: 0098- 2202. DOI: https://doi.org/10.1016/j.applthermaleng.2010.02.014