EXPERIMENTAL AND NUMERICAL STUDY OF FLOW IN RECTANGULAR ELBOW 90° WITH ROUNDED LEADING EDGE GUIDE VANE
"Study Case For Reynolds Numbers, ReDh = 2.1 x 10^4"

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Abstract
The use of elbows in the piping system will cause pressure loss caused by friction. This is due to the change in direction of fluid flow through the channel. Value of the pressure drop in flow to through the elbow is affected by the magnitude of the radius curvature, which led to the separation and secondary flow at the elbow. This will cause loss of flow energy (headloss) larger so that necessary efforts to reduce the pressure drop that occurs within elbow 90°. The test model used in this research an rectangular 90° elbow with a radius ratio (rm/Dh) is 1,875 without and with the addition of rounded leading edge guide vane and using ReDh ≈ 2,1 x 10^4. Fluid flow used in this experiment is air which incompressible, viscous, steady and uniform. The measured variable is stagnation and static pressure. Stagnation pressure was measured using a pitot tube, while the static pressure is measured using an inclined manometer connected to the wall pressure taps. The study was conducted experimentally and numerically 3D using Fluent software 6.3.26 and Gambit 2.30 with model k-ε Realizable. The results of this study showed that addition rounded leading edge guide vane in the elbow decreases the pressure
drop of 0.05% in the elbow compared without rounded leading edge guide vane. In the elbow with rounded leading edge guide vane, the secondary flows little than without rounded leading edge guide vane. Results of numerical simulation describe contours of pressure and velocity has been supported the experimental result.