

Numerical study about the change in flow separation and velocity distribution in a 90° pipe bend with/without guide vane conditions

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Abstrak

A single phase, incompressible turbulent flow through a 90° pipe bend with/without guide vane conditions has been studied here. The present work deals with the numerical simulation to investigate the change in flow separation and velocity distribution at the downstream section due to the effect of the guide vane. The k- ϵ turbulence model has been adopted for simulation purposes to obtain the results. After the validation of existing experimental and numerical results, a detailed study has been performed for three different Reynolds number and four different positions of the guide vane. The value of the Curvature ratio (R_c/D) has been considered as one factor for the present study. The curvature ratio can be defined as the ratio between the bend curvature radius and hydraulic diameter of the pipe. The results obtained from the present study have been presented in graphical form. A flow separation region has been found at the bend outlet for flow through 90° pipe bend without the guide vane. This flow separation region was absent for the cases which dealt with the flow through 90° pipe bend with the guide vane. Velocity distribution at four different downstream positions for different cases and different Reynolds numbers have been compared and reported in the present study.