Investigation of upstream length requirements for Venturi tube installation using CFD

ABSTRACT

The installation of Venturi tubes for high accuracy flow measurement in industrial application is normally based on the available international standards and guidelines. The international standard ISO 5167-4 provides guidelines on the installation requirements for Venturi in terms of upstream straight length requirements and configurations. This guideline indicates that any installation with upstream straight length lesser than the given minimum value, will incur additional 0.5% uncertainty on the discharge coefficient of the Venturi tube. The approach indicated by the international standard is very general and conservative. In this work, the numerical simulation was used to investigate the impact on the discharge coefficient, Cd, for installation with upstream straight length lesser than the given minimum value by comparing the numerical simulation results and experimental data, for Venturi tubes ranging from 100 mm to 250 mm. It was found that the numerical simulation results were within +/- 0.5% uncertainty and this is in line with the guidelines by the international standard.

Keyword: Upstream length; Venturi tube installation; Venturi tubes; CFD