

Comparison Between COMSOL Multiphysics® and Star-CCM+® Simulation Results and Experimentally Determined Measured Data for a Venturi Tube

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Abstract

Numerical simulation tools offer the opportunity to ascertain characteristic values, which are difficult to measure. A possible approach for validating simulation models by easy measurable data and gaining the needed values is described in this study of a Venturi tube.

The examination of the turbulent flow in a Venturi tube was performed using CFD models created with COMSOL Multiphysics® and Star-CCM+®. By using similar meshes and model settings in both tools a comparison between the numerical results was possible. In addition the numerical models could be validated by real measurements of differential pressure along the Venturi tube.

For various inlet flow velocities the velocity and pressure profiles in the tube were determined in 2D axisymmetric CFD models. The governing equations are the Navier-Stokes equations using the k-epsilon or the SST turbulence model.

In summary, the results obtained by COMSOL Multiphysics® are in good agreement with the results obtained by Star CCM+® as well as the experimentally determined measurements. Furthermore, characteristic values from the real model could be ascertained.