

Study of Coanda Effect for Fluid Jet flowing adjacent to a Curved Surface

Nikhil Sharma

Undergraduate

Department of Mechanical Engineering

Malaviya National Institute of Technology Jaipur, Rajasthan India

Abstract

The objective of this project is to study Coanda Effect for a fluid jet flowing adjacent to a curved surface using open source CFD package OpenFOAM. Coanda Effect is the phenomena in which jet flow attaches itself to a nearby surface and flow along it. Fluid jet sweeps along molecules of immediate surrounding fluid with the flow leading to formation of low pressure regions.

When a solid surface is placed close, the removal of molecules from the surrounding fluid causes reduction of pressure in that side of jet, this difference in pressure causes the deviation of fluid jet. The effect is observed with both curved and parallel surfaces. In this project, only fluid jets flowing adjacent to a curved surface have been studied.

Following is the geometry used in this project.

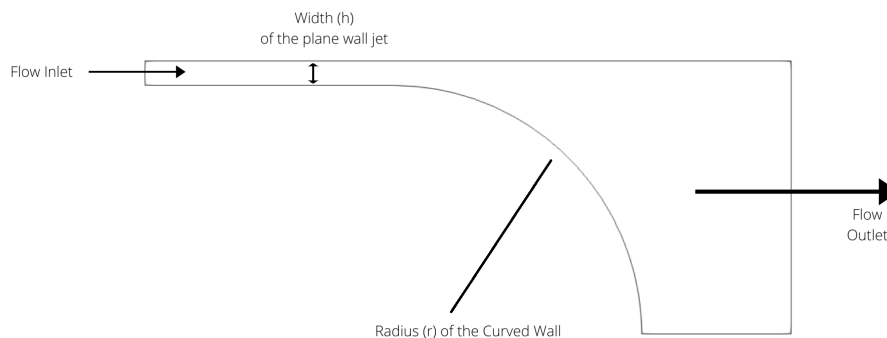


Figure 1: Geometry of the plain wall jet

A multiphase simulation needs to be run if the fluid in jet is different from the surrounding fluid like water jet flowing in air. If the fluid in jet is same as the surrounding fluid, a single phase simulation can also serve the purpose. In this project, multiphase simulations will be done using interFoam solver.

Different cases will be made by changing the jet fluid from air to water, cooking oil etc. Further effect of making slight changes to the geometry such as changing width of plane wall jet h and radius of the circular wall i.e. indirectly varying h/r ratio will also be studied.

REFERENCE

1. Trancossi, M., Dumas, A., & Vucinic, D. (2013). Mathematical modeling of Coanda effect (No. 2013-01-2195). SAE Technical Paper.
2. Wei, M. H. Y., & Corsiglia, V. R. (1970). An Analysis of Coanda Jet Flows. Analytic Methods in Aircraft Aerodynamics, 228, 197.