Study of Flow Pattern and Lift and Drag on a cylinder with two inlets at diametrically opposite points with parabolic velocity profile at inlet

---

Abstract- The present paper deals with the numerical simulation of unsteady, two-dimensional laminar fluid flow over a circular cylinder. Effects of injection of a secondary similar fluid from two diametrically opposite peripheral slots on the cylinder are of prime interest in the study. The injection arrangements have been investigated in a cross-flow arrangement, in which the second fluid is injected perpendicular to the free stream flow direction. Free stream velocity enters with a parabolic velocity profile through the primary inlet. A parametric variation of the velocity of the injected stream in the downstream wake region of the cylinder has been studied qualitatively by observing the velocity, vorticity & streamline and along with it a basic understanding and intuition about how mixing occurs within a combustor. The injection arrangements affected the vortex shedding in distinctly different manners. The geometry and meshing of the domain are created using *blockMesh* utility. The simulations are performed using **OpenFOAMv6** with *pimpleFoam* solver.
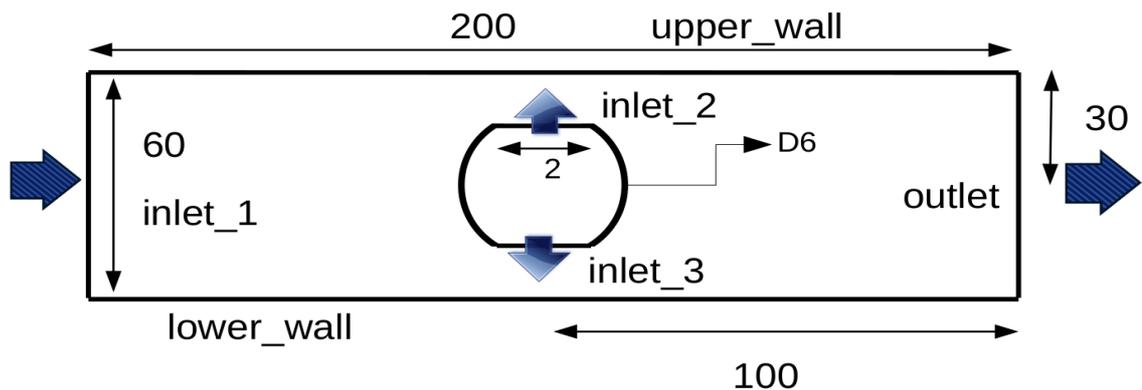
Problem statement

Fig:1 Flow over a truncated cylinder

A truncated cylinder within two parallel plates is shown in fig:1. Here lower_wall is AD and upper_wall is BC. And parabolic velocity is used at the inlet for my case study.

- ❖ **Case 1:**- velocity ratio ε =0.5
- ❖ **Case 2**:- velocity ratio ε =1
- ❖ **Case 3**:- velocity ratio ε =8

Properties and initial parameters:
1) Reynolds number=200,
2) The density of using fluid=997 kg/m 3

Reference :

1)"Effects of fluid injection on dynamics of flow past a circular cylinder" by Uddalok Sen