ME 412: CFD and Heat Transfer Lab

Spring Semester 2020-2021

Semester Project

- **Name and Roll No**

  Name : Maitreya Sinha
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- **Title:**

  Analysis of active control of vortices generated by a bluff body in a flow using rotating cylinders

- **Goal:**

  To numerically simulate the flow around a cylinder with two rotating cylinders placed at the wake, which suppresses the vortices and reduce the induced instabilities.

- **Reference of Paper which you will base your study on if any:**
  - I. Korkischko, J.R. Meneghini,Suppression of vortex-induced vibration using moving surface boundary-layer control,Journal of Fluids and Structures, Volume 34, 2012, Pages 259-270, ISSN 0889-9746
  - Sridhar Muddada, B.S.V. Patnaik, An active flow control strategy for the suppression of vortex structures behind a circular cylinder, European Journal of Mechanics - B/Fluids, Volume 29, Issue 2,2010,Pages 93-104,ISSN 0997-7546,
  - Schulmeister, J., Dahl, J., Weymouth, G., & Triantafyllou, M. (2017). Flow control with rotating cylinders. Journal of Fluid Mechanics, 825, 743-763. doi:10.1017/jfm.2017.395

- **What is unique or additional that you will do compared to that paper**

  We will try to analyze the effect of gap and various control cylinder diameters and positioning. Further, if time permits, we will try to analyze the vortex suppression in a domain with transverse motion of the bluff body.

- **What is the domain you will study. Please provide a figure**

The following figure is a representative figure of the proposed study plan. We will be using a similar domain, to analyze the vortices.

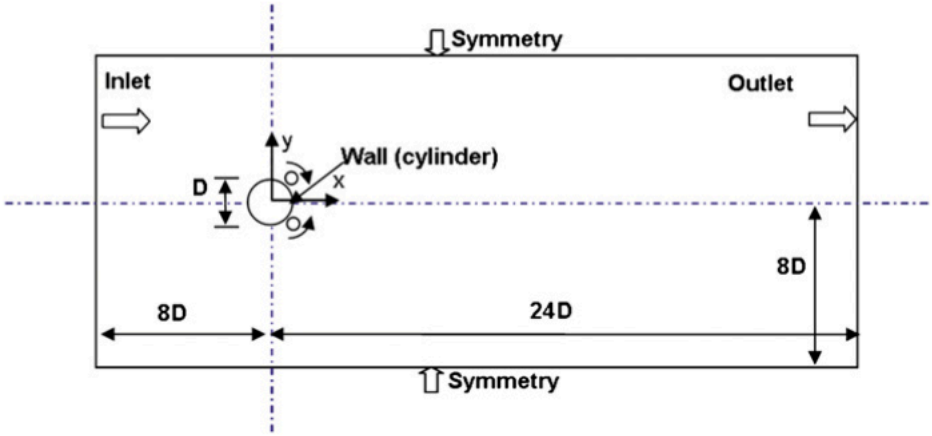

Figure 1: Flow domain. Picture used from the paper: "An active flow control strategy for the suppression of vortex structures behind a circular cylinder " by Muddada and Pattnaik

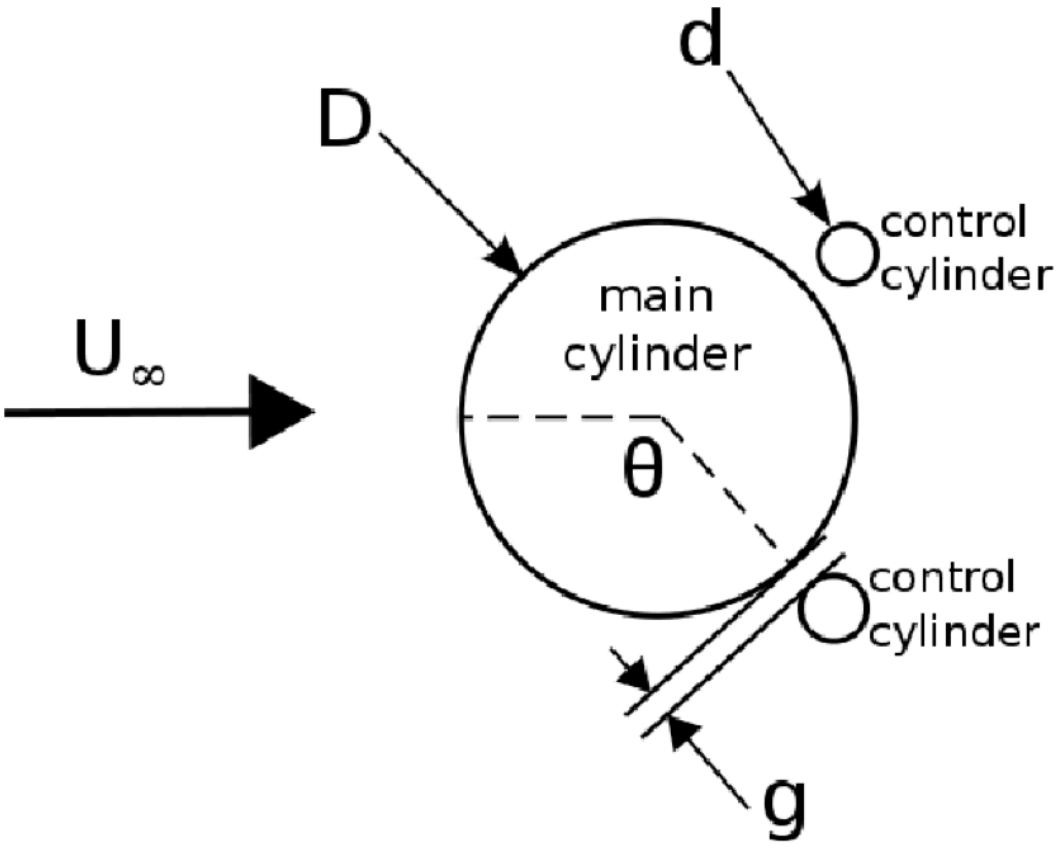

Figure 2: Representation of the flow configuration. Picture used from the paper : "Flow Control with Rotating Cylinders" by Schulmeister, Dahl, Weymouth and Triantafyllou.