

# Control and Flow Reaction in a Microfluidic Network in OpenFOAM

Mohit Kumar Saw<sup>1</sup> Pranay Kumar Pandey<sup>2</sup> and Sameer Jadhav<sup>3</sup>

<sup>1</sup>Mechanical Engineering, Visvesvaraya Technological University, Belagavi, Karnataka, India

<sup>2</sup>FOSSEE, Indian Institute of Technology Bombay, Maharashtra, India

<sup>3</sup>Assistant Professor, Department of Chemical Engineering Indian Institute of Technology, Bombay, Maharashtra, India

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## Abstract

This paper will study how fluids flow through tubes with round barriers on their interior surface under conditions of low to moderate flow. A computational fluid dynamics (CFD) program named OpenFOAM (which is free) will be used to perform this analysis. There will be two types of tubes that will be analyzed. The first tube will have one barrier inside, while the second tube will have multiple barriers. Each of these two types of tubes will be simulated as follows: the flow of fluid through both types of tubes will be calculated using the Navier-Stokes equations, and then the velocity and pressure fields created will be plotted in order to demonstrate the non-linear relationship between the flow rate and pressure difference due to the effect of the interior barriers, especially at the higher range of Reynolds numbers. The information generated from this study will contribute to a better understanding of how to modify the direction of flow in order to create Braess's Paradox, as well as to be used at a later date to develop a 5-channel (microfluidic) network.