

# CFD Simulation of Tesla Valve

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## Problem Statement

To numerically simulate the behaviour of Tesla valve in forward and reverse flow condition. And then calculate the diodicity of the tesla valve under different flow rate.

The Tesla valve dimension are as follows:

1.  $D = w = 100e-6$  m
2.  $L1 = L2 = 600e-6$  m
3.  $\alpha = 45$  deg
4.  $L = 235e-6$  m
5.  $R = 228e-6$  m

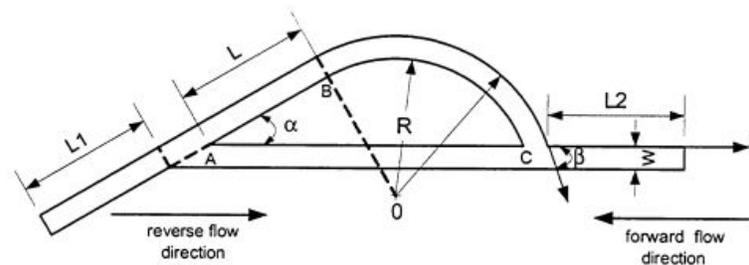


Figure 1 Geometry of Tesla Valve [1]

The simulation will be carried out for 5 different flow rates as  $500 \mu l / min$ ,  $750 \mu l / min$ ,  $1000 \mu l / min$ ,  $1250 \mu l / min$ ,  $1500 \mu l / min$ . The working fluid is water and its density  $\rho = 1000 \text{ kg/m}^3$  and viscosity  $\mu = 4.6 \times 10^{-4} \text{ Pa s}$ . The solver used is **simpleFoam** with no turbulence models cause the maximum Reynold number is 543 which is less than 2300.

## Reference:

1. Truong, T.Q. and Nguyen, N.T., 2003. Simulation and optimization of tesla valves. Nanotech,1, pp.178-181.