TU Clausthal

Neural Network-based Detection of Taylor Vortices in Annular Flow Systems

Exposé for Master Thesis - Initial Presentation

Mahyar Alikhani, Institute of Applied Mechanics
10. Dezember 2023

Contents

Problem Statment

Task definition and objective

Approache

Initial Results

Time Planning

Problem Statment

Taylor-Couette Flow

- It is defined as a fluid dynamic phenomenon that occurs when a fluid is passing between two coaxial-rotating cylinders.
- Inner cylinder is typically rotating faster than outer cylinder. This configuration can lead to various flow patterns and instabilities.
- Dimensionless control parameters like Re, ration of cylinder radii,

Objectives

- Governing equ:

$$\frac{\partial \mathbf{u}}{\partial t} + (\mathbf{u} \cdot \nabla)\mathbf{u} = -\frac{1}{\rho}\nabla p + \nu \nabla^2 \mathbf{u} + \mathbf{f} \tag{1}$$

- w.r.t boundary conditions:

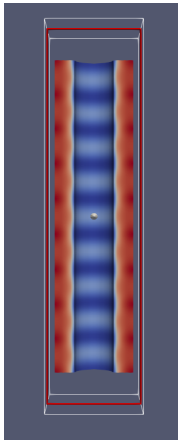
$$\mathbf{u} = \mathbf{u}_0 \quad \text{at} \quad \Gamma_1 \tag{2}$$

$$\mathbf{u} = 0 \quad \text{at} \quad \Gamma_2 \tag{3}$$

$$\frac{\partial p}{\partial n} = 0 \quad \text{at} \quad \Gamma_3 \tag{4}$$

Approaches

Results



Timeline

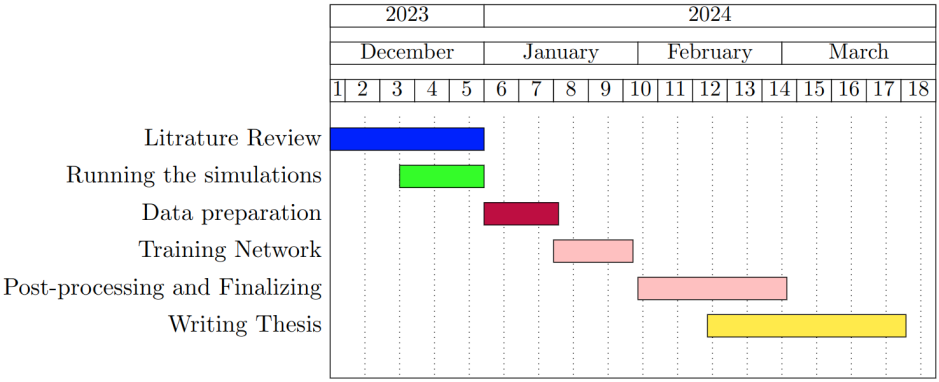


Abbildung: Timeplan

Thank you!

Any questions?