ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

swissloop

euroTUBE

Study of Compressor Application for improving Tube Blockage Ratio for High-Speed Vacuum Transport

Short Description

Global rise in mobility brings traditional modes of transport to their limits. Vacuum Transportation enables an efficient and safe way of transport. Capsules, so-called pods, travel at high speeds on a rail through a low-pressure tube in order to minimize drag.

ETH Zurich's Hyperloop Team Swissloop participated with other university teams in Elon Musk's Hyperloop Pod Competition for three consecutive years. Due to the lack of testing infrastructure in Europe for R&D, the EuroTube Foundation aims to accelerate the breakthroughs in vacuum transportation and to push the promising concept forward by building a 3km long test track in the canton of Valais, Switzerland.

The goal of this thesis is to develop a CFD model which verifies one of the initial Hyperloop ideas, a compressor mounted on the pod in order to optimize the blockage ratio and circumvent the Kantrowitz Limit. This eventually results in a cost efficiency for both tube and pod construction.

The results of this thesis lay a firm foundation for possible future aerodynamic studies (e.g. compressor development for a Swissloop Pod). This thesis is conducted at the Institute of Fluid Dynamics (IFD) in collaboration with EuroTube and Swissloop.

Type	Semester or Master thesis
Partner	ETHZ, EuroTube Foundation, Swissloop
Start date	tbd
End date (planned)	tbd
Student(s)	tbd
Internal supervisors	Nathalie Nick, nathalie.nick@swissloop.ch Fabio Dubois, fabio.dubois@eurotube.org
External supervisors	Institute of Fluid Dynamics

Work packages

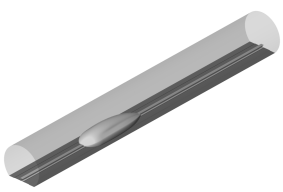
- Literature review
- Study of existing models and methods from related work
- Setup of CFD model in order to:
  - Analyze flow around pod with compressor mounted on pod
  - Investigate parameters and benefit of using a compressor
  - Find associated optimal blockage ratio
  - Specify compressor parameters for future prototype design
- Documentation and writing of report or paper

Requirements

- High motivation and interest in the topic
- Able to work independently and be creative
- Methodological and goal-oriented working behavior
- Prior knowledge in numerical simulations (lectures during Bachelor's or Master's [e.g. Berechnungsmethoden / Computational Methods for Engineering Applications / Turbulent Flows / …] or expertise acquired through own projects)
- Good theoretical understanding of fluid dynamics / computational fluid dynamics

Application

Please fill in the application form:
https://docs.google.com/forms/d/e/1FAIpQLSdy-SFLzuIYiQICpFioLzTfWrsVnUZaepN4AVJ2FO3E_1I__g/viewform



Swissloop Pod in Tube, Hyperloop Pod Competition 2019

Planned AlphaTube Infrastructure, Collombey-Muraz, Switzerland