

Simulation of Magnetic Levitation Concepts for Hyperloop Pods

Short Description

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

The test track AlphaTube, built by the EuroTube Foundation, enables the research and testing on levitation technology for high-speed vacuum transport. Many active and passive approaches exist leveraging different electromagnetic force principles. An optimal levitation system unites a robust and fail-safe way of operation at maximal efficiency and form factor.

This thesis shall explore the patents and concepts for an optimal levitation mechanism tailored for a safe and efficient guiding of high-speed vehicles in vacuum transport tubes. A FEM simulation shall be conducted to assess the electromagnetic and thermal limits, which are furthermore validated with a rapid prototype for the proof-of-concept.

Type	Semester thesis or Master thesis
Partner	ETHZ, EuroTube Foundation
Start date	14.09.2020
End date (planned)	tbd
Student(s)	tbd
Internal supervisor	Fabio Dubois, fabio.dubois@eurotube.org
External supervisor	Dr. Jasmin Smajic, jasmin.smajic@ief.ee.ethz.ch

Work packages

- Literature review of related work and compilation of requirements list
- FEM Mult-physics modelling and simulation of electro-thermal behaviour
- Power estimation, coil dimensioning and electronics design for levitation mechanism
- Manufacturing, assembly, and testing of levitation prototype
- Performance evaluation on demo showcase

Requirements

- High motivation and interest in the topic
- Able to work independently and be creative
- Methodological and goal-oriented working behavior
- Good theoretical understanding of electromagnetic fields and their FEM analysis
- Experience with design of mechatronic systems and simple electronics
- Knowledge about vacuum transport technologies is beneficial

Application

Please email your CV and transcript to jasmin.smajic@ief.ee.ethz.ch



Planned AlphaTube Infrastructure, by EuroTube Foundation



Swissloop Pod Claude Nicollier (2019)