

Student project proposal

Project title

Design and Assembly of a Test Bench for Studying a Linear Electric Motor.

Project type



MSc thesis



BA semester project



MSc semester project

Project responsible and e-mail

Lucien Pierrejean – lucien.pierrejean@epfl.ch

Project description

The proposed project is part of the EPFLoop team's research into the propulsion of high-speed levitated vehicles and the electrification of transport. A linear electric motor can be considered as the “flat counterpart” of a rotary electric motor. It converts electrical power into linear motion through magnetic field.

As part of the study of homopolar linear synchronous motor (H-LSM), the aim of this project is to design a test bench to characterise the forces created by the motor. It will consist of a rotating disc, where rotation is ensured and controlled using a rotating motor, and a fixed linear motor, mounted on force sensors on both sides of the rotating disc.

The goal is to re-use an existing test bench by adapting it to the H-LSM. As a first step, design work involving the study of stresses and strains in the structural elements will be required to assess the forces involved in the various mechanical parts. The second step will be to order the parts from suppliers and assemble the new test bench configuration.

Tasks of the student

- Study the different ways of adapting the existing test bench.
- Design mechanical parts based on studies of stresses and strains in the elements.
- Order parts and assemble the new test bench.

Requirements

- CAD design tool.
- Mechanical design.
- Electric machines (basic knowledge to understand the operating principle of the linear motor and the forces involved).

Literature

- [1] Details about the existing test bench can be found in:
S. Rametti, L. Pierrejean, A. Hodder, and M. Paolone, “Pseudo-Three-Dimensional Analytical Model of Linear Induction Motors for High-Speed Applications,” *IEEE Trans. Transp. Electrific.*, pp. 1–1, 2024, doi: [10.1109/TTE.2023.3348655](https://doi.org/10.1109/TTE.2023.3348655).