

## Student project proposal

### *Project title*

### **Development of a Time-Dependent 3D FEM model for the Electromagnetic Analysis of a Linear Electric Motor.**

*Project type*       MSc thesis       BA semester project       MSc semester project

### *Project responsible and e-mail*

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### *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.

The aim of this project is to develop a 3D model of a linear electric motor, using finite element method (FEM), to evaluate performance in terms of thrust, levitation and effects due to the motion of the motor. The model will include a time dependence to simulate transients and will use the moving mesh feature to represent the motion of the motor relative to the ground infrastructure.

A basic knowledge of CAD, FEM and electric machines is required.

The model will be developed on COMSOL Multiphysics, using AC/DC module.

### *Tasks of the student*

- Get familiar with COMSOL interface.
- Build the 3D geometry.
- Mesh the model.
- Configure study steps.
- Configure solvers.
- Run and validate the results.

### *Requirements*

- CAD (basic).
- FEM knowledge (basic).
- Electric machines (basic).

### *Literature*

- [1] <https://www.comsol.com/acdc-module>