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Student project proposal

Project title

Design and analysis of Inductances, Efficiency and Power Factor of a Linear Induction Motor (LIM)

Project type MSc thesis BA semester project MSc semester project

Project responsible and e-mail

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Project description

In the current research undergoing at EPFL on the hyperloop and more specifically on the LIM, the design process is able to generate the thrust characteristic.

The missing step is to be able to calculate the inductances, efficiency and power factor. This would allow a full design by not only know the thrust, efficiency and power factor, but also by deducing an equivalent diagram from the knowledge of the inductances values.

Knowing the inductances, efficiency and power factor is of major importance as it allows the design and simulation of the whole propulsion chain which include the power electronics and the BESS (Battery Energy Storage System).

From the knowledge geometry and of the winding layout of the LIM, the inductances will be calculated analytically (Matlab) and validated by comparison to a COMSOL 3D model of the LIM.

The same methodology can be applied for the efficiency and the power factor where the development is done analytically (Matlab) and compared to COMSOL 3D model for validation.

Tasks of the student

- Understand the behaviour of the LIM
- Use COMSOL, and develop related models.
- Calculate inductances from the knowledge of the geometry and of the winding layout (using Matlab)

Requirements

- Be motivated in learning techniques that are not necessarily thought during regular courses
- Willing to join a research environment
- Be independent and able to learn new skillsets
- Be able to participate with other members of the research team working on the project.