INTERNSHIP PROPOSAL

Topology Optimization of Magnetic Actuator for Additive Manufacturing

Figure 1: Magnetic actuator design (left) and Fe-Si lattice structures (right) – Cenaero©

Topology optimization allows the creation of innovative designs by maximizing efficiency while simultaneously minimizing mass and complying with the limitations of industrial manufacturing.

Incorporating meso-scale elements within lattice structures has demonstrated superiority over Density and Level Set methods (widely used) for thermo-mechanical and vibrational challenges.

Integrating magnetic properties into the lattice-based design of actuators, seems promising to achieve optimal performance, balancing both magnetic and mechanical performances, while strategically adressing additive manufacturing's geometric limitations as design constraints to streamline optimization for efficient manufacturing.

Objectives

The objective is to integrate magnetic behavior into the mesoscale model while incorporating specific additive manufacturing geometric constraints, aiming to unlock the advantages of lattice-based topology optimized magnetic device design. This investigation seeks to elevate the performance of magnetic devices.

The project could be followed by an experimental validation through LACAMI additive manufacturing equipments with high content silicon-iron alloy if the progress of the master thesis allows it.

Profile

- *Required: Bachelor + ongoing Master's studies in Mechanical, Electromechanical, or Aeronautical Engineering or data science.*

- *Languages: English and/or French.*

- *Pre-requisites: notions of structural mechanics + electro-magnetic simulations + programming (Python).*

- *Motivation, creativity and team spirit!*

Duration

The length of the internship can vary from 4 months to 6 months, depending on your university or school regulations.

Contact

Interested candidates should send a cover letter, quoting reference number of the offer, and a resume to
rh_be-ip-2024-006@cenaero.be