

Bachelor's/ Master's/ Semester Thesis

Simulation with COMSOL: Magnetic Separation

Keywords: Modelling | Downstream | Magnetic Separation| COMSOL

Project Description

Magnetic separation is an innovative technology for purifying various valuable substances from, for example, fermentation broths. In the future, this novel process should represent a more cost-effective alternative to chromatography. A prerequisite for this is optimized process control. The solely experimental investigation, however, is costly and requires a lot of time. In this context, mathematical models are important tools that can be used to investigate separation mechanisms.

In this work, mechanistic/physical models will be derived in COMSOL that simulate specific physical mechanisms of magnetic separation. Especially the separation of magnetic particles inside a high-gradient magnetic field will be investigated. On the one hand, this should make physical effects that are difficult or impossible to measure accessible, and on the other hand, the models should be used for digital twins to optimize the process. Finally, the models will be validated through specific experimental data.

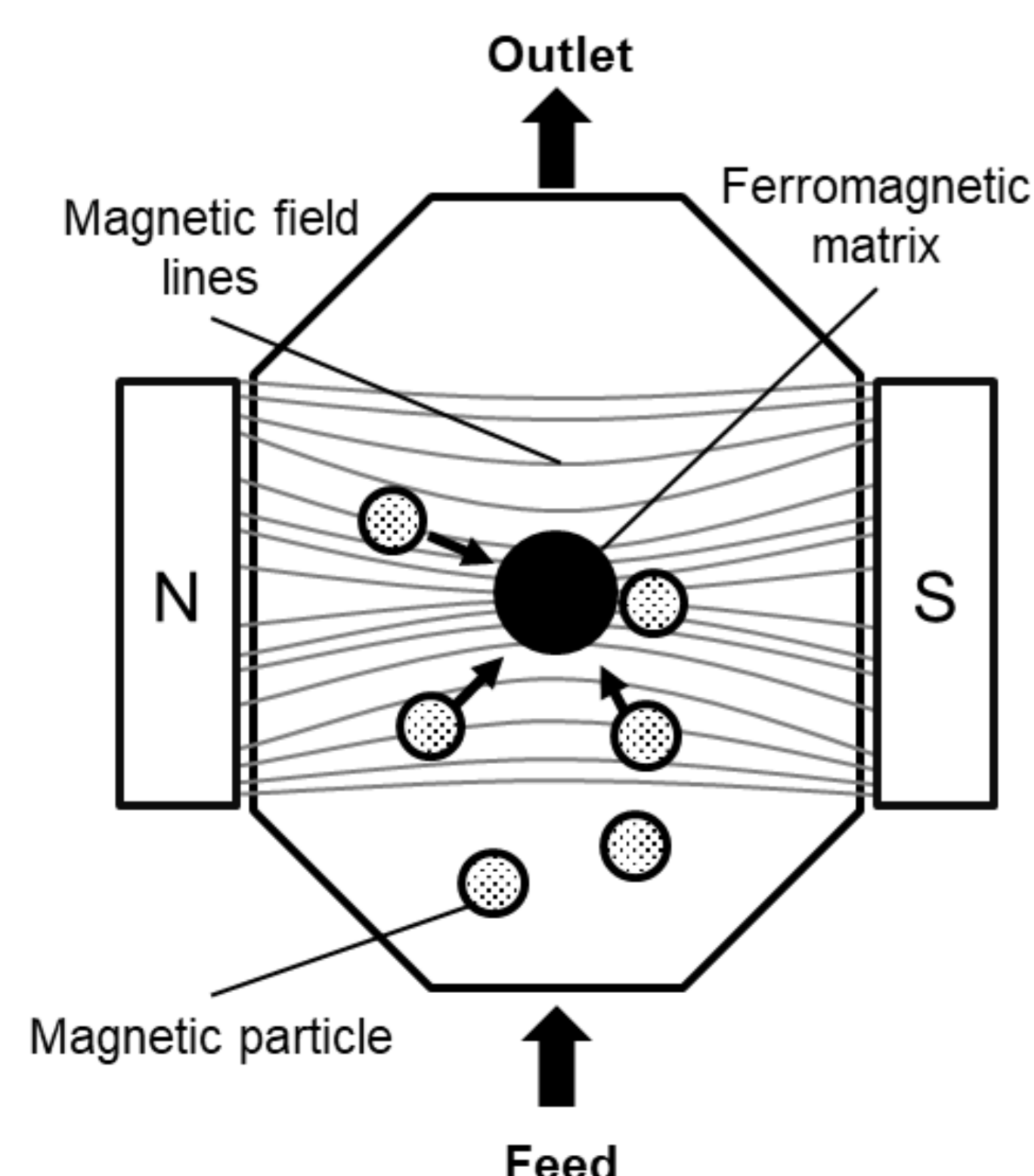
Profile

- Bachelor or master student in engineering, physics, or related studies
- Structured and independent work
- Motivation to work as a team
- **Start date:** flexible

Tasks

1. Derive mechanistic models
2. Simulation in COMSOL
3. Validation with experimental data
4. Integration into process control

HGMS Principle



COMSOL Outputs

