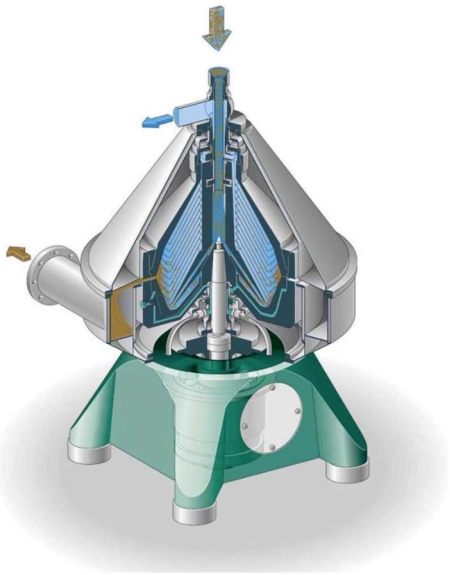
TUG

Paid Master Thesis

process & particle engineering

Modeling the Separation Performance of a Disk Stack Centrifuge

Background



The Institute of Process and Particle Engineering, in collaboration with the spin-off SimVantage, is developing simulation and AI tools for the design and optimization of industrial bioprocessing units. Disk stack centrifuges are widely used in biotechnology and pharmaceutical manufacturing for continuous solid–liquid separation, such as harvesting cells or clarifying fermentation broth. However, scaleup and scaledown pose massive problems.

This master thesis focuses on developing a computational model to simulate the separation performance of a disk stack centrifuge. The objective is to predict the spatial and temporal distribution of particles and the efficiency of separation under varying operational conditions. Flow fields and geometry representations are already available in the existing simulation software. Your task will be to integrate particle transport and sedimentation modeling into this framework.

Tasks

- Literature Review: Review centrifuge principles, particle settling in rotating systems, and existing separation models.
- Model Development: Develop a mathematical model for particle transport and separation based on centrifugal sedimentation.
- Implementation: Integrate the model into the current simulation software.
- Validation: Test the model with representative cases and, if possible, validate against literature or experimental data.
- Documentation: Summarize methodology, results, and conclusions in a thesis and presentation.

Expected Results

- A predictive model for particle separation in a disk stack centrifuge based on hydrodynamics and particle properties.
- A working simulation module integrated into the existing software framework.
- Validation of the model under various operating scenarios.
- A comprehensive and practically oriented thesis contributing to advanced process simulation tools.

You will be part of an **internationally recognized research group and company**!

Start: Anytime

Contact

Univ. Prof. Dr. Johannes **Khinast**, +43 316 873 30400, khinast@tugraz.at

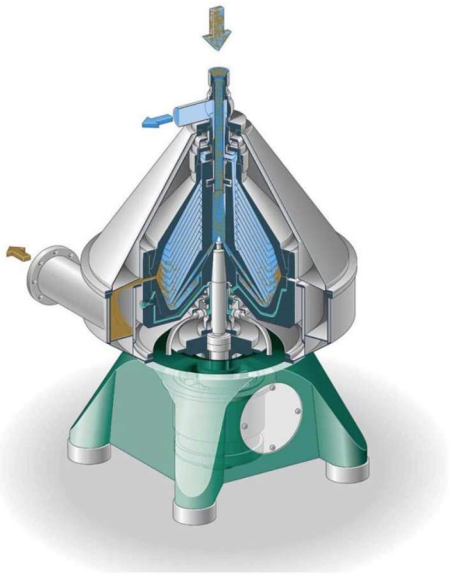
TUG

Paid Master Thesis

process & particle engineering

Modeling the Separation Performance of a Disk Stack Centrifuge

Background



The Institute of Process and Particle Engineering, in collaboration with the spin-off SimVantage, is developing simulation and AI tools for the design and optimization of industrial bioprocessing units. Disk stack centrifuges are widely used in biotechnology and pharmaceutical manufacturing for continuous solid–liquid separation, such as harvesting cells or clarifying fermentation broth. However, scaleup and scaledown pose massive problems.

This master thesis focuses on developing a computational model to simulate the separation performance of a disk stack centrifuge. The objective is to predict the spatial and temporal distribution of particles and the efficiency of separation under varying operational conditions. Flow fields and geometry representations are already available in the existing simulation software. Your task will be to integrate particle transport and sedimentation modeling into this framework.

Tasks

- Literature Review: Review centrifuge principles, particle settling in rotating systems, and existing separation models.
- Model Development: Develop a mathematical model for particle transport and separation based on centrifugal sedimentation.
- Implementation: Integrate the model into the current simulation software.
- Validation: Test the model with representative cases and, if possible, validate against literature or experimental data.
- Documentation: Summarize methodology, results, and conclusions in a thesis and presentation.

Expected Results

- A predictive model for particle separation in a disk stack centrifuge based on hydrodynamics and particle properties.
- A working simulation module integrated into the existing software framework.
- Validation of the model under various operating scenarios.
- A comprehensive and practically oriented thesis contributing to advanced process simulation tools.

You will be part of an **internationally recognized research group and company**!

Start: Anytime

Contact

Univ. Prof. Dr. Johannes **Khinast**, +43 316 873 30400, khinast@tugraz.at