

Simulation tool for pharmaceutical bioreactors: Adaptive grid refinement

Background

The Institute of Process and Particle Engineering is a world leader in the development of simulation tools for industrial-scale bioprocessing units. For example, our current code can model processes in large-scale bioreactors, up to 200m³.

We are therefore looking for a bachelor or master student with engineering background (chemical engineering, bioprocess engineering, physics or similar) interested in extending the simulation tool by adding an **adaptive grid refinement** algorithm.



The simulation code currently uses a regular grid. For small structures, i.e. small stirrers, the grid around the structure may be too coarse to resolve fine details, e.g. the fluid jet coming from the stirrer. Hence, the objective of this thesis is to employ a **new grid addressing scheme and advanced interpolation methods** to be able to define areas with a finer grid efficiently within the simulation code.

The coding is done in C++ in combination with the CUDA library on **high-performance graphic cards**.

Tasks

- Find and implement a new grid addressing scheme
- Research and choose interpolation methods
- Literature study on test cases to validate the program module
- Include the validation in the test harness of the code

Requirements

- Background in chemical or bioprocess engineering, physics or similar
- Basic biotechnological knowledge
- Being familiar with thermodynamics, simulation and modeling

What we offer:

- Integration in an internationally leading team
- Opportunity to be part of a commercialization project
- Paid master thesis
- Start of a future career in software creation

Start: Summer/Fall 2019

Contact

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