

Performance and validation of CFD-DEM-simulations of stirred and shaken bioreactors

The aim of this project is to investigate the correlation of the morphology and the productivity for filamentous microorganisms. Early results showed an increased concentration of the antibiotic product due to the addition of macro particles to the cultivation media. The increase of the product concentration is apparently results from mechanical stress caused by the particles. The due to macro particle induced mechanical stress inside stirred and shaken bioreactors are quantified by using CFD-DEM-simulations. Here the fluid flow is described by the computational fluid dynamics (CFD) and the particle movement within the fluid is represented by the discrete element method (DEM).

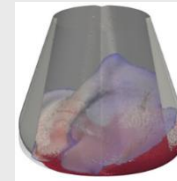
The following topics are actually available:

- Performance of CFD-DEM simulations of a stirred and shaken bioreactor to quantify the mechanical stress for different process parameters
- Correlation of the mechanical stress with biotechnological parameters like the product concentration
- Extension and optimization of the simulation models
- DEM-calibration and validation (simulation and experiment)
- Validation of the particle movement inside the bioreactors via particle imaging velocimetry

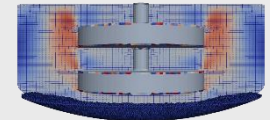
Info: Previous knowledge in the field of simulations are not obligatory

- Offered to students of the fields of mechanical engineering, Bio- Chemical- and Pharmaceutical-Engineering,
- Scope and duration of the work will be adjusted to fit the requirement of each kind of thesis
- Feel free to contact me for a non binding conversation about this or other possible topics

Shake flask



Bioreactor



Start:

Any time desired

Contact:

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