

Dr.-Ing. Paul Kieckhefen

Ludwigshafen, Germany

✉ mail@kieckhefen.eu

🏠 kieckhefen.eu

📞 [kieck](https://www.kieckhefen.eu)

Computational Engineer

Research Focus

Apparatus Optimization using Computational Techniques.

- Fluidized beds [4, 6] and spouted beds [10, 11] for spray coating and granulation
- Granular mixing in batch and continuous mixers

Method Development for Modeling Industrial-Scale Multiphase Flows.

- Recurrence CFD for time-extrapolating recurrent multiphase flows [7, 10]
- Parallelization of coupled simulation codes [7]
- Liquid bridge state modeling in the Discrete Element Method [4]
- Product property-guided scale-up methods [4]
- Simulation-guided product tailoring

Education

- 02.2018- **Dr.-Ing.**, Hamburg University of Technology, Grade: with distinction.
12.2021 Supervisor: Prof. Dr.-Ing. habil. Dr. h.c. Stefan Heinrich (stefan.heinrich@tuhh.de)
Thesis: *A Novel Method for Predicting Product Properties in Fluidized Bed Spray Granulation* [4]
- 04.2016- **M. Sc. Process Engineering**, Hamburg University of Technology, Grade: 1.3 (with distinction).
01.2018 Thesis: *Evaluation of the Recurrence CFD method for the Simulation of Industrially Relevant Fluid and Particle Dynamics* at BASF SE, Ludwigshafen with grade 1.0.
- 10.2013- **B. Sc. Bioprocess Engineering**, Hamburg University of Technology, Grade: 1.6 (very good).
03.2016 Thesis: *CFD-DEM Simulation of a Prismatic Spouted Bed* with grade: 1.0

Experience

Professional

- since 10.2021 **Senior Specialist Digitalization**, Fluid, Particle and Reaction Modelling, BASF SE, Ludwigshafen.
- 02.2018- **Research Assistant**, Institute of Solids Process Engineering and Particle Technology, Hamburg
09.2021 University of Technology.
Supervisor: Prof. Dr.-Ing. habil. Dr. h.c. Stefan Heinrich (stefan.heinrich@tuhh.de)
- Simulation of solids processing apparatuses from food, pharmaceutical and chemical industries
 - Preparation of three successful German research foundation grant proposals (438775980, 454277381, 460241719)

Internships

- 09.2017- **Evaluation of the Recurrence CFD method for the Simulation of Industrially Relevant**
01.2018 **Fluid and Particle Dynamics**, BASF SE, Ludwigshafen; Johannes Kepler University Linz, AT.
- Implementation of a volumetric timeseries extrapolation method for flow processes on the basis of recurrence analysis
 - Application of a novel method to a variety of industrially relevant application cases [10]
- 04.2016- **Simulation of Cascaded, Continuous Spouted Beds**, BASF SE, Ludwigshafen.
09.2016
- Simulation of spouted beds with the CFD-DEM method and validation against lab experiments [9]
 - Simulation of pilot-scale cascaded spouted beds and design of internals and operating conditions

Qualifications

- Tech Skills excellent: Python (pandas, scikit-learn, scikit-image, SciPy stack), C/C++ (MPI, CUDA)
advanced: Docker, keras, HPC (high performance computing)
- Software OpenFOAM, Aspherix/LIGGGHTS, CFDEMcoupling, ANSYS Fluent, StarCCM+
- Lang. German: native speaker English: fluent

Publications

- [1] P. Kieckhefen, S. Pietsch-Braune, and S. Heinrich. “Product-Property Guided Scale-Up of a Fluidized Bed Spray Granulation Process Using the CFD-DEM Method”. *Processes* (2022). DOI: 10.3390/pr10071291.
- [2] M. Orth, P. Kieckhefen, S. Pietsch, and S. Heinrich. “Correlating Granule Surface Structure Morphology and Process Conditions in Fluidized Bed Layering Spray Granulation”. *KONA Powder and Particle Journal* (2022). DOI: 10.14356/kona.2022016.
- [3] A. Atxutegi, P. Kieckhefen, S. Pietsch, R. Aguado, M. Olazar, and S. Heinrich. “Unresolved CFD-DEM simulation of spherical and ellipsoidal particles in conical and prismatic spouted beds”. *Powder Technology* (2021). DOI: 10.1016/j.powtec.2021.05.012.
- [4] P. Kieckhefen. “A Novel Method for Predicting Product Properties in Fluidized Bed Spray Granulation”. PhD thesis. Hamburg University of Technology, 2021.
- [5] P. Kieckhefen, M. Dosta, S. Pietsch, and S. Heinrich. “Possibilities and Limits of Computational Fluid Dynamics-Discrete Element Method Simulations in Process Engineering: A Review of Recent Advancements and Future Trends”. *Annual Review of Chemical and Biomolecular Engineering* (2020). DOI: 10.1146/annurev-chembioeng-110519-075414.
- [6] E. Diez, P. Kieckhefen, K. Meyer, A. Bück, E. Tsotsas, and S. Heinrich. “Particle dynamics in a multi-staged fluidized bed: Particle transport behavior on micro-scale by discrete particle modelling”. *Advanced Powder Technology* (2019). DOI: 10.1016/j.apt.2019.05.025.
- [7] T. Lichtenegger, P. Kieckhefen, S. Heinrich, and S. Pirker. “Dynamics and long-time behavior of gas–solid flows on recurrent-transient backgrounds”. *Chemical Engineering Journal* 364 (2019), 562–577. DOI: 10.1016/j.cej.2019.01.161.
- [8] S. Pietsch, P. Kieckhefen, M. Müller, M. Schönherr, F. K. Jäger, and S. Heinrich. “Influence of binary and ternary particle systems on the spouting stability in a three-dimensional prismatic spouted bed”. *Powder Technology* (2019). DOI: 10.1016/j.powtec.2019.08.065.
- [9] P. Kieckhefen, S. Pietsch, M. Höfert, M. Schönherr, S. Heinrich, and F. Kleine Jäger. “Influence of gas inflow modelling on CFD-DEM simulations of three-dimensional prismatic spouted beds”. *Powder Technology* 329 (2018), 167–180.
- [10] P. Kieckhefen, T. Lichtenegger, S. Pietsch, S. Pirker, and S. Heinrich. “Simulation of spray coating in a spouted bed using recurrence CFD”. *Particuology* (2018). DOI: 10.1016/j.partic.2018.01.008.
- [11] S. Pietsch, P. Kieckhefen, S. Heinrich, M. Müller, M. Schönherr, and F. K. Jäger. “CFD-DEM modelling of circulation frequencies and residence times in a prismatic spouted bed”. *Chemical Engineering Research and Design* (2018). DOI: 10.1016/j.cherd.2018.01.013.
- [12] S. Pietsch, P. Kieckhefen, M. Müller, M. Schönherr, F. K. Jäger, and S. Heinrich. “Novel production method of tracer particles for residence time measurements in gas-solid processes”. *Powder Technology* (2018). DOI: 10.1016/j.powtec.2018.06.040.