Acceleration of CFD-DEM Simulations with Machine Learning

TUHH
Hamburg
University of
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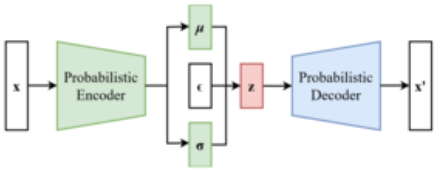
INSTITUTE OF
SOLIDS PROCESS
ENGINEERING &
TUHH PARTICLE TECHNOLOGY

Master thesis projects for up to 3 students

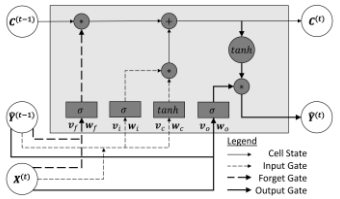
The goal of this master thesis is to reduce the computational cost of CFD-DEM simulations with the help of machine learning. Your thesis could focus on one of these aspects:

- Super-resolving of sparse grids with convolutional neural networks
- Generation of initial guesses of the flow fields with generative adversarial neural networks or variational auto-encoders
- Forecast of latent flow field representations with recurrent neural networks

The goal of your thesis is to estimate the speed-up potential of your developed model for a given simulation case.



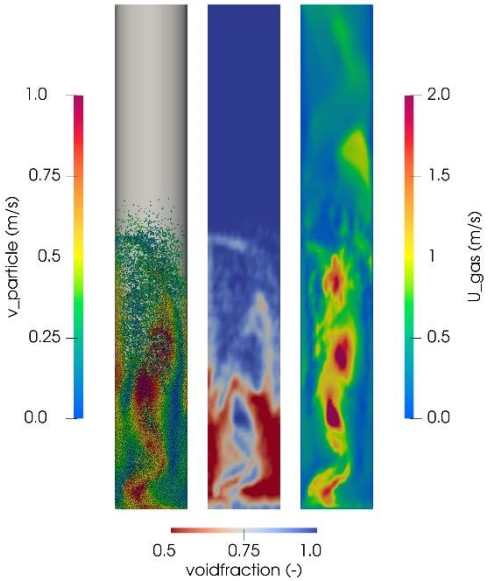
Variational Auto-Encoder



Recurrent neural network

TensorFlow OpenFOAM

Main frameworks



Potential application of your work: simulations of fluidization

Start:

Any time

Remarks:

Prior experience in OpenFoam and Python is beneficial for this work.

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