



Improved mesh generation for fixed beds for the direct reduction process of iron oxide pellets

Internship at Zittau

Mission

With the increasing burden of atmospheric carbon dioxide on our environmental ecosystem, the decarbonisation of the steel industry is of major importance. In the view of a more sustainable steel production, the DLR Institute of Low-Carbon Industrial Processes is working on a breakthrough technology called direct reduction. In this process, iron ore pellets are reduced with a synthesis gas or even green hydrogen. Detailed CFD models of fixed beds are being developed and compared with experimental data. The aim of the master thesis is to improve the mesh generation process and run detailed CFD simulations of the direct reduction.

Work steps

- Familiarization with OpenFOAM and with the implemented workflow:
 - Run a DEM simulation to determine the pellets position in a fixed bed
 - Extract the positions and generate a mesh with a third-party software
 - Run the multiphase reactive CFD simulation
- Tests of different meshing algorithms
- Treatment of the points of contact between pellets during mesh generation
- Verification of the mesh quality by running CFD simulations of the DR process
- Automate the fixed bed mesh generation process

Skills required

- Currently studying physics, chemistry, mechanical engineering, aerospace engineering or a comparable field
- Interest in theory, modelling and simulation of physical processes
- Knowledge of fluid dynamics and CFD. Experience in OpenFOAM is a big plus.
- Programming experience in C++, Python or other scientific programming languages is preferable

Start: 06.2024

Place: Zittau

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