OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

WORKGROUP FOR MULTIPHAS FLOWS

3-phase flows

Grant number

SO 204/20-1

Project title

Modelling and numerical calculation 3-phase flows with the Euler/Lagrange Approach

Project leader

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Realized by

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Keywords

3-phase flows, Euler/Lagrange Approach, collision model

Short description of the project

Within the scope of this research project the Euler/Lagrange approach for the calculation of three phase gas-liquid-solid-systems has to be expanded. This project has to be realized in close collaboration with Prof. Hempel (Braunschweig) and Prof. Räbiger (Bremen). At first, it is necessary to introduce the effective fluid density into the conservation equations of the fluid phase to allow calculations of industrially relevant gas and solid concentrations. Further on, it is essential to enhance the convergence behaviour of the Euler/Lagrange approach to assure efficient calculations for high dispersed phase volume fractions. A basic goal of this project is the modelling of the interactions between the two dispersed phases (momentum transfer).

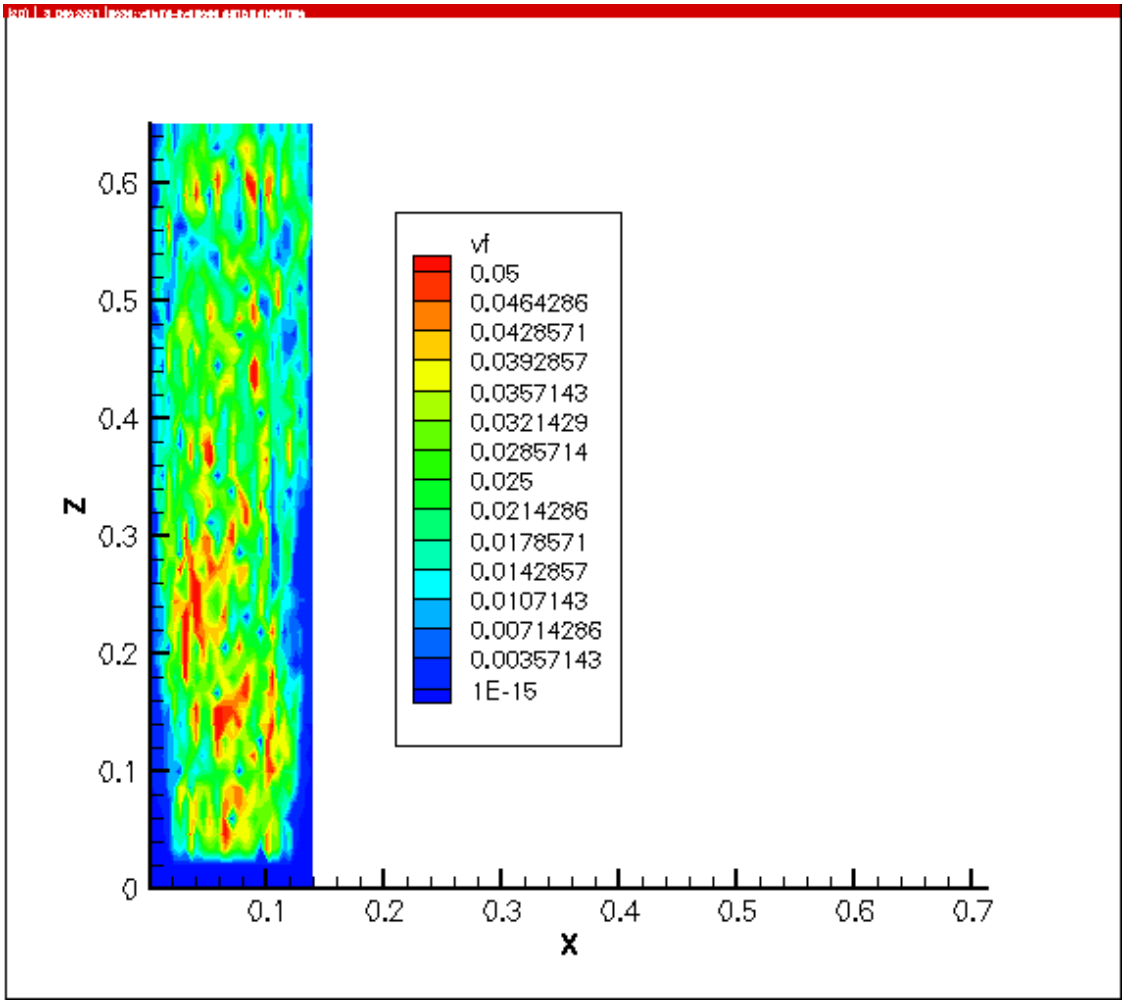

Photo: Calculated temporal evolution of gas distribution in a bubble column, gas content 2%, bubb size 2 mm

At first, this should be realized in an integral way using modified drag coefficients which are known from literature. Another approach should be based on the collisions between the phases which should be described with the aid of a stochastic collision model. The modelling of the interactions should be improved and validated on the basis of the detailed experiments from the working group of Prof. Räbiger. Further on, the Euler/Lagrange calculations should be used to improve the integral models whicl finally will be implemented in the Euler/Euler model of the working group of Prof. Hempel. The Euler/Lagrange approach, which has been developed for three phases systems, will be used for the calculation of driven jet reactors and airlift reactors to submit detailed insight into the hydrodynamics. From the working groups of Prof. Räbiger and Prof. Hempel extensive experimental test for these equipments are available for the validation of the calculations.