ulm university universität uulm

Mathematisches Kolloquium

Stochastic geometry for the 3D characterization of dense populations of particles: Application to two-phase flow

Sprecher: Dr. Mathieu De Langlard

Eingeladen von Prof. Dr. Volker Schmidt

21.12.2018 | 14:30 Uhr | R220 HeHo 18

In the research and development of nuclear fuel treatment processes involving multiphase flows, the characterization of bubbles, drops and solid particles is a key issue. Today, the extraction of spatial and geometrical characteristics of a particulate system is achieved mainly by image analysis techniques, such as detection and segmentation, applied on 2D images of the considered multiphase flow. However, they present two main drawbacks: 1) their performances decrease when the object density in the images increases, and 2) they only deal with 2D characteristics of the projections (and not on the 3D ones).

Models from stochastic geometry, mainly marked point processes or germ-grain models, are promising approaches to overcome these drawbacks. Assuming that the particles are almost spherical or ellipsoidal, they can be seen as a 3D marked point process (such as a hard-core Matérn point process for instance), and the appropriate model can be fitted to experimentally acquired 2D images of the flow. In this talk, the relevance of stochastic geometry will be emphasized in the case of a bubbly flow, with different flow rates (i.e. for several sizes and densities of bubbles). At low gas flow rates, the proper fit of the covariance and opening function indicates the ability of the model to reproduce the key features of the experimental data.

Der Vortrag ist für ein breites Publikum geeignet