Announcement of an ad hoc Minisymposium on

Lattice Boltzmann Methods for Particulate Flows

Friday, October 28, 2022, 10:00 – 12:00
Room: RZ 2.037, e-Studio

Program:

10:00 Timm Krüger *(School of Engineering, University of Edinburg)*

Formation and stability of pairs of particles in inertial microfluidics

Inertial particle microfluidics is an emerging technology for microfluidic particle separation and manipulation. We investigate the formation and stability of pairs of soft particles under mild inertia through immersed-boundary-lattice-Boltzmann-finite-element simulations. The behaviour of the pair strongly depends on the lateral position of the pair in the channel which in turn is softness-dependent. Our results demonstrate that particle softness must be considered in the design of inertial microfluidic devices for manipulating inter-particle spacing.

10:40 Christoph Schwarzmeier *(Lehrstuhl für Systemsimulation, FAU)*

Simulation of upstream-migrating antidunes with a coupled discrete element and free-surface lattice Boltzmann method

Upstream-migrating antidunes are a particular type of bedform that develops at the interface between fluid and granular beds in motion. The mechanisms of their seemingly counterintuitive movement in the opposite flow direction are not well understood yet. We present a numerical approach to simulate antidune formation and propagation with geometrically resolved particles. The model is based on a coupled discrete element and free-surface lattice Boltzmann method, the latter of which we will introduce in more detail in this talk.

11:20 Eric Climent *(Institute of Fluid Mechanics IMFT Toulouse and INP-ENSEEIHT, CNRS, Univ. Paul Sabatie)*

Simulation of particle-fluid interactions: particulate flow around a cylinder with LBM and transition to turbulence in suspension with FCM)

The effect of particles on flow instability and turbulence is a longstanding topic of research either by experiments or simulations. I will talk about the specific case of finite size particles in two distinct configurations: flow around a cylinder and dispersion in turbulent Couette and Poiseuille flows. Based on numerical simulations, I will show how particles trigger hydrodynamic instabilities and influence turbulent properties of the carrying flow. I will comment on the intricate interplay between particle accumulation and the transition from laminar to turbulent flow. These two generic configurations help a better understanding of the complex interaction between the migration of particles and flow dynamics.

Participation will be possible in person or via teleconferencing. The link will be distributed e.g., on csc.fau.eu in a few days