Open Post-Doc position

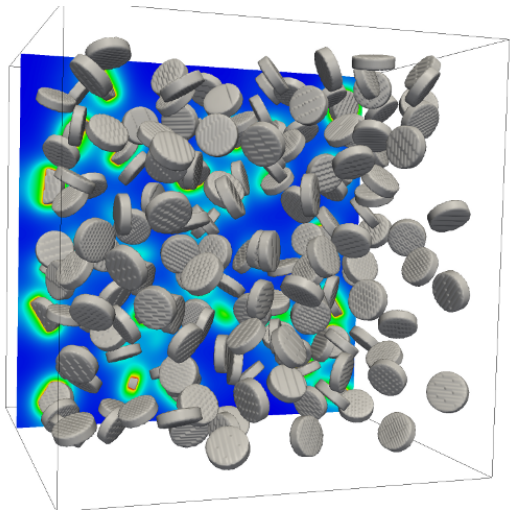
Simulation of Sheared Anisotropic Colloidal Suspensions

Keywords:
Colloids, anisotropic, flow, shear, rheology, simulation, electrostatics

Academic context:
This post-doctoral research position is part of the NEMESIS project (2016-2019), a chair attributed to Jeff Morris (Levich Institute, City College of New York) at the University of Toulouse.

Project summary:
Many industrially relevant complex fluids are constituted of a Newtonian liquid and small anisotropic particles called colloids (e.g. suspensions of clay platelets, rod-like viruses). When these suspensions are forced to flow, the relative positions and orientations of the particles, referred as “microstructure”, are modified. They can form amorphous or crystalline phases depending on the particle shape, surface charge and shear rate. This has direct applications to driven assembly of colloids or flow-assisted crystallization. Moreover, this microstructure determines the rheology of the suspension. If the microstructure-stress relations are well known for Brownian Hard Spheres, it is less so for anisotropic particles.

The first aim of this project is to explore the type of microstructures observable at different shear rates and different electrostatic interaction ranges and strengths. The second aim is to investigate the microstructure-stress relations for dispersions of anisotropic and charged colloids.



These investigations will be carried out thanks to simulations resolved at the particle scale, accounting for both many-body hydrodynamic and electrostatic interactions. The post-doc will have to couple existing codes developed in our team: solvers dedicated to hydrodynamics or electrostatics.

Profile:
The person recruited will work in a team including two Ph.D. students, whose role will be to perform complementary SAXS experiments and simulations. The post-doctoral researcher will be responsible for the numerical developments and optimizations required for the project. He or she should have both a strong background in programming, including high-performance computing, and a good understanding of the underlying physics.

Academic supervisors:
Jeff Morris (CCNY), Micheline Abbas & Yannick Hallez (University of Toulouse)

Administrative aspects:
Job location: Toulouse at the Laboratoire de Génie Chimique (www.lgc.cnrs.fr); Duration: 18 months; Net salary including social security: ~2200 euros/month.

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