



Microhydrodynamics

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Systems of micro-objects moving in fluids are in focus of modern science, owing to numerous biomedical and industrial applications, including lab-on-chip factories. The goal of the course is to introduce theoretical foundations needed to describe dynamics of such systems.

Main topics:

1. Dynamics of micro-particles in fluids - time scales, fluid inertia, Reynolds number, reversibility of flows, examples
2. Stokes equations, boundary conditions
3. Grand resistance and grand mobility problems, hydrodynamic interactions in the presence of external forces, torques or ambient flows
4. Particulate flows in a bounded geometry, Green tensors, point-particle model
5. Multi-pole method of solving the Stokes equations, Rotne-Prager approximation
6. Motion of rigid and flexible multi-particle systems
7. Self-diffusion in dispersive media
8. Examples of applications (bacteria, algae, polymers, proteins, micro and nangles)

The total number of lecture hours: 30, laboratory exercises: 0 hours, self-teaching: 60, direct tutoring and consultations: 15 hours.

ECTS Points: 4