FURUKAWA LAB.

[Nonlinear and nonequilibrium phenomena in complex fluids]

Department of Fundamental Engineering

Physics of complex fluids

Department of Applied Physics

http://www.complexfluid.iis.u-tokyo.ac.jp

Physics of complex fluids : from glasses, colloids, granular systems to bacteria

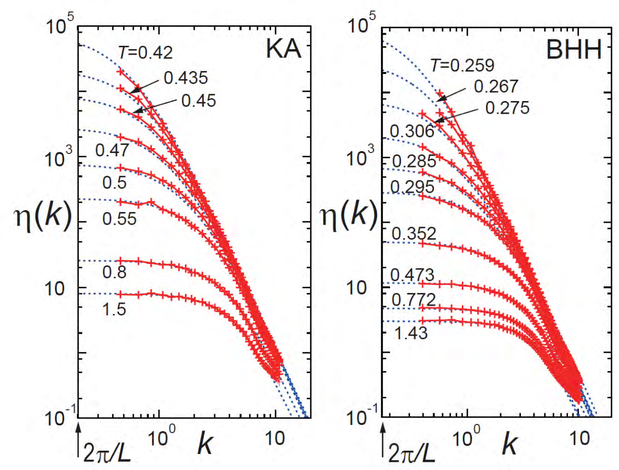
- We theoretically investigate nonlinear and non-equilibrium phenomena in various soft materials and complex fluids, from glasses, colloids and granular systems to bacteria.

In recent years, we have primarily focused on the following problems:

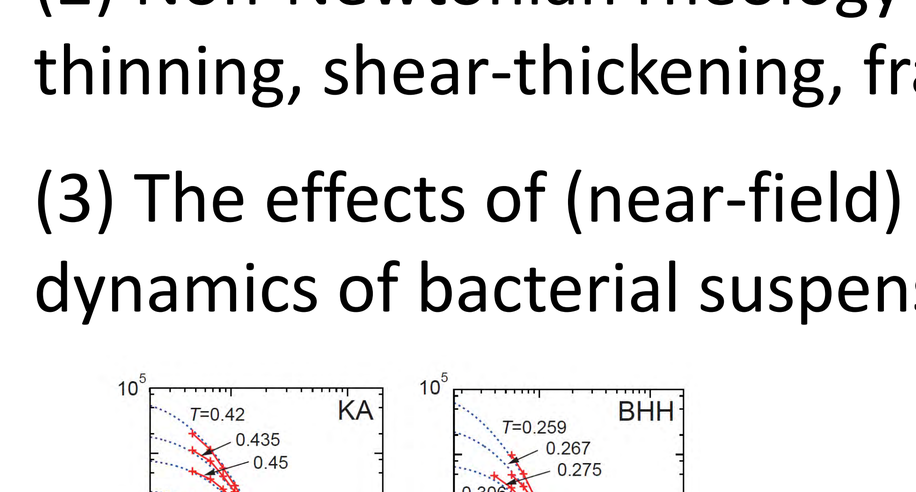
(1) The origin and role of spatial correlations of anomalous hydrodynamic transport in supercooled liquids

(2) Non-Newtonian rheology of glassy and granular materials (shear-thinning, shear-thickening, fracture, etc.)

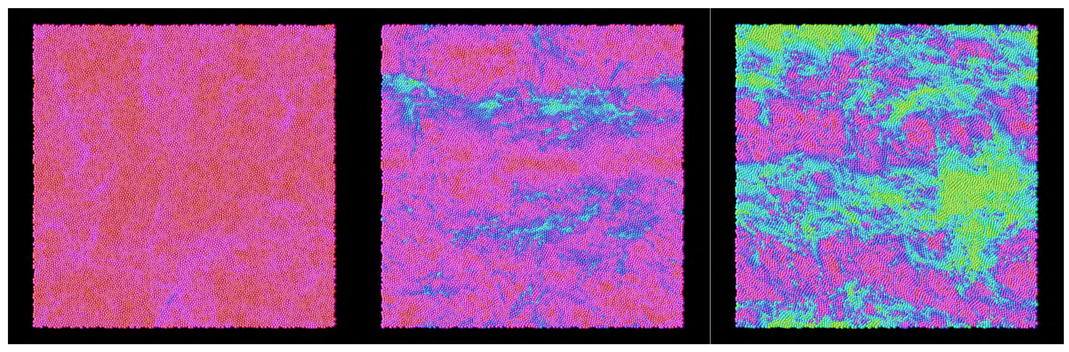
(3) The effects of (near-field) hydrodynamic interactions on the collective dynamics of bacterial suspensions.



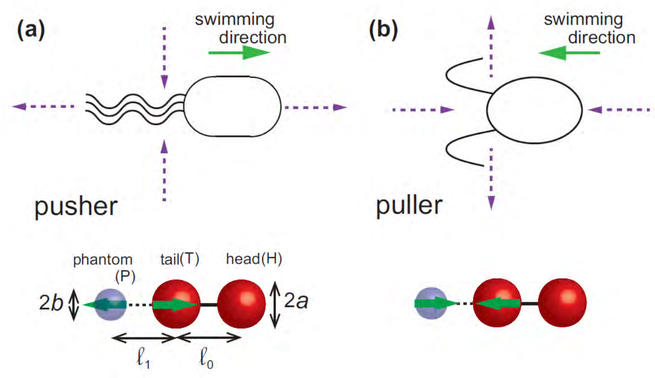
Wavenumber dependent shear viscosity



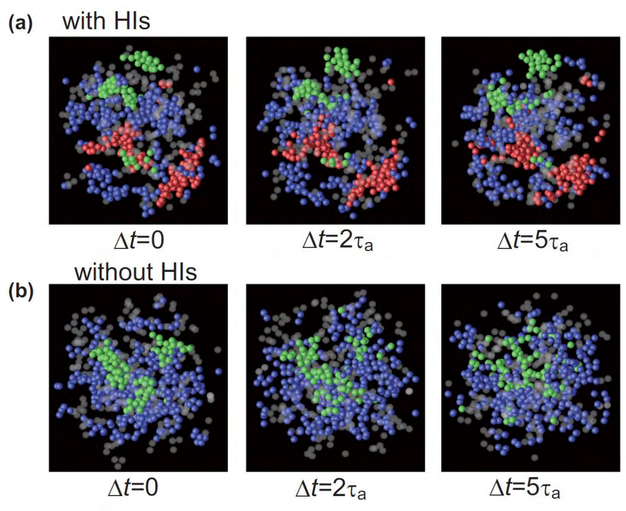
Relaxation time of density fluctuations



Shear band formation in supercooled liquids



Minimal microorganism model



Hydrodynamic effects on the collective dynamics of bacterial suspensions