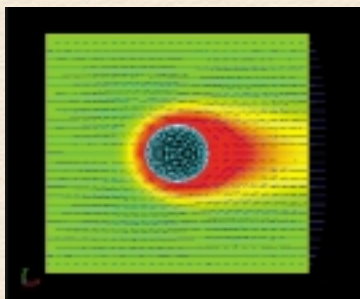


PhaseSeparation : The multi-phase dynamics simulator for polymeric fluids under shear and electric fields with hydrodynamic effects. The figure shows the phase separation structure of a polymer blend under shear (left), spin coating simulation with evaporation under shear(right).



Electrolyte : The multi-component electrolyte fluid dynamics simulator under flow and electric fields. The figure shows the concentration of ions around a charged obstacle placed in a uniform flow.

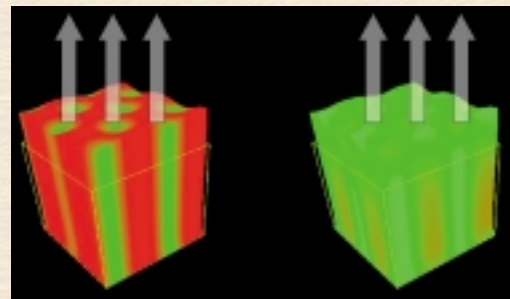
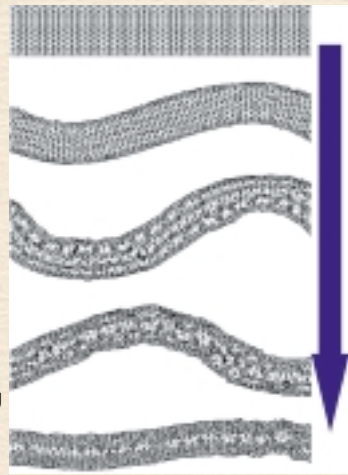


MEMFluid : The micro electro mechanical fluid dynamics simulator for multi-component electrolyte fluids in a micro-fluid chip. The figure shows a chemical reaction in a micro-reactor chip.

GelDyna : The large deformation dynamics simulator for multi-phase gel systems by change of external stimuli, such as temperature, pH, electric fields, and external forces.

ElaDyna : The non-linear elasticity dynamics simulator.

The figure shows the shrinking pattern and bending of gels under drastic temperature changes.



Elastica : The linear elasticity simulator for multi-phase solid systems, including both isotropic and anisotropic elasticity. The figure shows the deformation (left) and strain-energy (right) of a cylindrical phase structure obtained by SUSHI under an external force.

MUFFIN

(**M**ulti**F**arious **F**ield simulator for **N**on-equilibrium system)

MUFFIN is a general solver for the continuum models for the dynamics of soft materials based on finite difference method (FDM) or finite element method (FEM). MUFFIN includes six packages, **Elastica**, **ElaDyna**, **GelDyna**, **Electrolyte**, **MEMFluid** and **PhaseSeparation**, and can deal with various problems in soft materials, such as the elasticity of multi-phase materials, swelling and deswelling of gels, ion transport in charged colloids, reaction and diffusion in narrow channels, phase separation and droplets deformation in shear and electric field. MUFFIN can take the multi-phase structure obtained by SUSHI and can calculate various properties such as the effective elastic modulus of the system.

Examples of applications

- * Phase separation of polymeric fluids under shear flow
- * Spin coating
- * Electro-rheological fluids
- * Electrophoresis and electroosmosis
- * Micro-reactors and micro-fluid chips
- * Soft-actuators using electrolyte gels
- * Drug delivery systems using pH-sensitive gels

