Dynamics and rheology of soft materials

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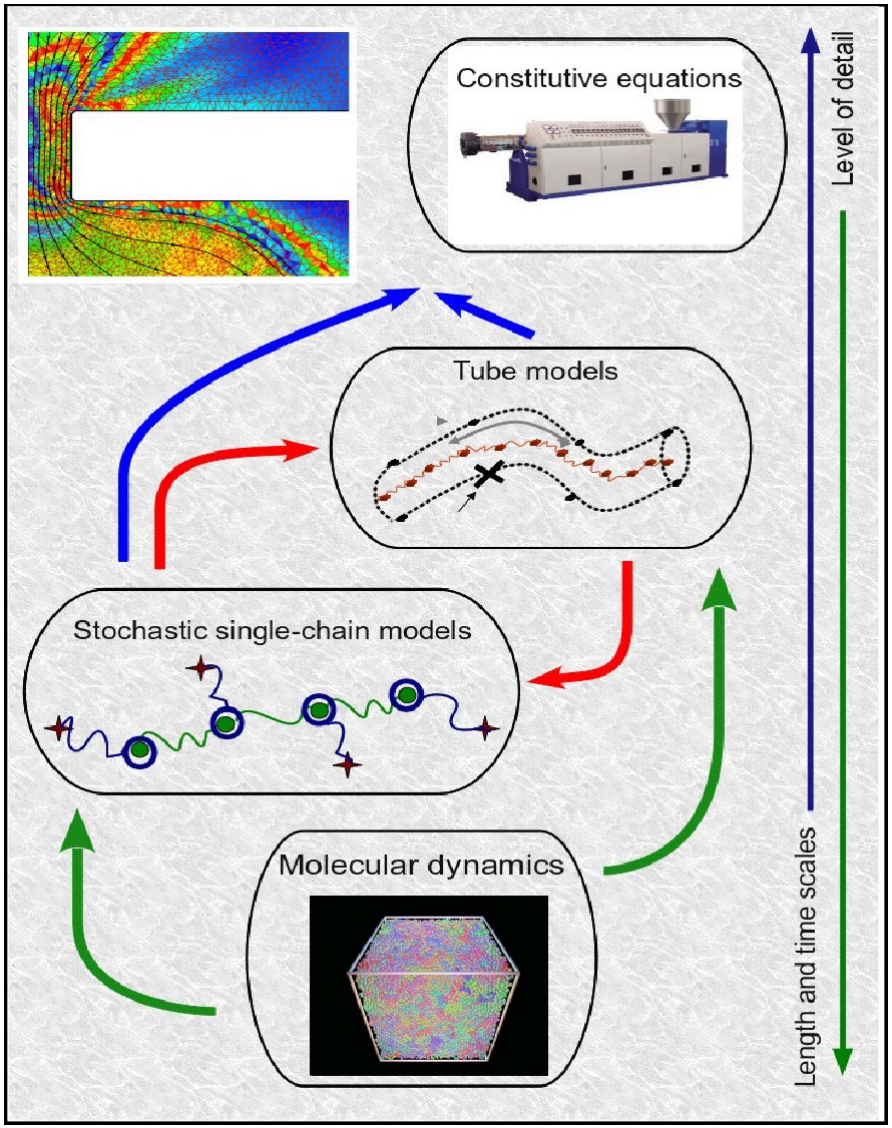

The focus of our group is on flow phenomena in soft materials with an emphasis on the dynamics and rheology of entangled polymers. We use computer simulations and analytical theory with vital input in the form of questions, motivation and reality check from experiments. The work is relevant for improving industrial polymer processing and for solving problems that arise during production. In addition, we are investigating the processing of polymer multilayers by first exploring the shear-induced slip at a polymer/polymer interface and its effect on the adhesion between the immiscible polymer layers.

One long term goal of our group is to understand macroscopic flow phenomena from a molecular point of view, i.e., in terms of the individual and collective dynamics of the molecules. Towards this end, we are pursuing a hierarchical approach using various models to span the entire range of length and time scales in polymeric materials. The models include different levels of detail depending on the size and time scale, see figure. Establishing the relationship between the models, we hope to use the hierarchy to improve existing technologies and to design novel materials and processing routes.

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