

Soft matter, a case of study: from complex suspensions to liquid crystals

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Hints to the dynamics of suspensions. Anisotropic suspended particles; the simplest case: the rigid rod.

Brownian dynamics for suspensions of micrometric particles: convection and diffusion. Smoluchowski equation for rigid rods. Adoption of a Brownian description in molecular modeling.

Back to equilibrium: Maier-Saupe nematogenic potential of angular interaction among rigid rods. The onset of a nematic phase.

Modeling the dynamics of nematic liquid crystals. The stress tensor. Linear limit: comparison with Leslie stress tensor. Peculiar rheology far from the linear limit.

Inhomogeneous nematics: macroscopic phenomenology. Linear description of the statics of inhomogeneous nematics: Frank theory. Defects. Hints to deGennes approach.

A simple generalization of Maier-Saupe nematogenic potential to a nonlocal form. Calculating the linear limit of nematostatics: the elastic constants. Nonlinear nematostatics: "entering" a defect.

Low flow rate dynamics in the presence of defects: a tentative supersimplified description.

Open problems and perspectives.

Bibliography:

M.DoI, S.F.Edwards, *The theory of polymer dynamics*, Clarendon Press, Oxford (1986)

G.Marrucci, F.Greco, *Flow behavior of liquid crystalline polymers*, Advances in Chemical Physics LXXXVI (I.Prigogine and S.Rice Eds.), Wiley Publ. (1993), pp. 331-402.

Z.Dogic, P.Sharma, M.J.Zakhary, *Hypercomplex Liquid Crystals*, Annual Review of Condensed Matter Physics 5 (2014), pp. 137-157.