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Flows of liquid crystals and incompressible viscoelastic fluids

The study of flows of liquid crystals plays an important role in understanding many other incompressible viscoelastic fluids. The equations describing these Non-Newtonian fluids are based on remarkably similar theories in physics and they have shared much of the mathematical properties as well. In this lecture I shall explain some recent works concerning some model equations, and to describe connections between them. I shall also try to present a couple fundamental unsolved mathematical questions regarding these equations.