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Deformation of drops immersed in elongational flow with vorticity

In the science of materials, multiphase fluids, i.e., fluids composed by two or more different substances, are frequently found in industrial applications. A starting point for the above is the study of deformation of a single drop induced by an equally simple flow. This work focuses on the fluid mechanics of a two-phase fluid: a pair of immiscible fluids that may have different values of viscosity and the same density.

This work addresses the dynamics of drop deformations immersed in an immiscible fluid that occurs under a large class of linear 2D-flows. It is based on a numerical technique that describes the 3-dimensional evolution of shape of the drop using a Boundary element method algorithm. I will present the fundamentals of the theoretical and numerical implementation of the algorithms. Then I will discuss about the flow effects on drops with small viscosities. The numerical data is compared with experimental data of Rosas and the theoretical results of Taylor and Cox. Then, I will present an analysis of the 3D-effects of the shape of the drop as a consequence of the imposed flow.