The Dynamics of Bubbles and Drops in Viscous Liquids
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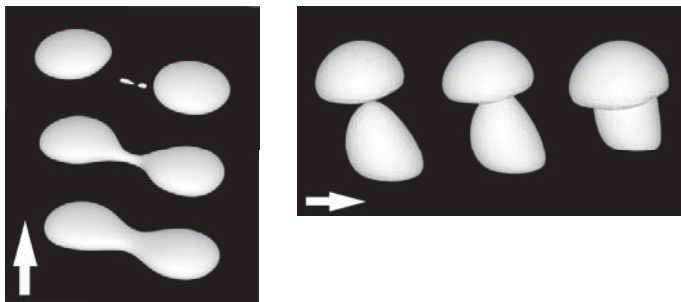Fig. 1 Bubble motion rising in viscous liquids.

Fig. 2 Complex motion of bubble and drop.
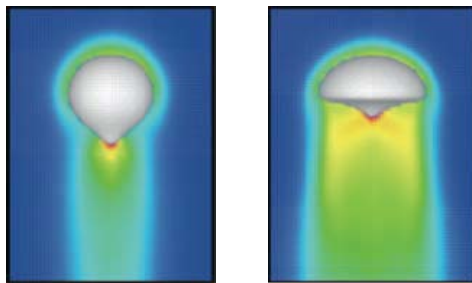Left: drop breakup Right: bubble merging

Fig. 3 Bubble motion rising in viscoelastic liquids.
(Elastic stress distribution)

Content:

  Computational fluid dynamics (CFD) can be a useful tool for understanding detailed flow structures and mechanisms of the dynamic motion of bubbles and drops. Our laboratory computationally explores various motion of single bubbles and drops in immiscible viscous liquids including non-Newtonian fluids:

• Bubble/drop rise motion (Fig. 1)

• Complex (deformation/break-up/coalescence) bubble/drop motion (Fig. 2)

• Bubble/drop rise motion in non-Newtonian fluids (Fig. 3)

  Our computations are implemented using sophisticated numerical methods such as Volume-of-Fluid, Coupled Level-Set/Volume-of-Fluid, Moment-of-Fluid methods to numerically track the interface.

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                    Non-Newtonian fluid
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