Students' Annual Seminar

Droplet deformation in shear flow and film flow over an inclined plane

Rashmi Ramadugu

In this talk I will discuss two problems namely the droplet deformation in shear flow and film flow over an inclined plane. Droplet deformation in shear flows is one of the classical problems in physics of multiphase flows. Taylor[1], in his seminal paper, showed that droplet deformation is proportional to the Capillary number at low shear rates. A variety of numerical methods have been used to study this problem. In this talk, we will present two numerical techniques: a) Phase-field method, and b) Volume of fluid method, that have been used to study droplet deformation in shear flows.

We will present a detailed comparison of these two methods. Tears of wine is a phenomenon seen in a glass of wine (mainly a mixture of alcohol and water). This phenomenon occurs because of the interplay between the surface tension and gravity. The tears of wine phenomenon is studied by considering a thin film of fluid mixture on an inclined plane similar to the work done by [2, 3]. In this talk, we will present the comparison of the numerical simulations with the stability analysis for the tears of wine phenomenon.

References

[1] G. I. Taylor, The Viscosity of a Fluid Containing Small Drops of Another Fluid, Proceedings of the Royal Society of London. Series A, Containing Papers of a Mathematical and Physical Character 138.834 (1932): 41-48
[2] R. Usha, O. Tammisola, R. Govindarajan, Linear stability of miscible two-fluid flow down an incline, Phys. Fluids.25, 104102 (2013)
[3] AE. Hosoi, JWM. Bush, Evaporative instabilities in climbing films, J. Fluid. Mech. 442,217-239 (2001)

Thursday, Dec 10th 2015

4:00 PM (Tea/Coffee at 3:45 PM)

Seminar Hall, TCIS