FM8L_11723

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Numerical Simulation of Liquid–Gas Interfaces with Applications to Atomization

Thomas Boeck, **Stephane Zaleski**

Laboratoire de Modélisation en Mécanique, Paris, France

We investigate the two-phase mixing layer between high speed liquid and gas jets. This flow leads to the breakup of the interface into small droplets and is the basic mechanism in atomization processes. We use Volume of Fluid methods to investigate this flow numerically. Some recent versions of the Volume of Fluid method conserve momentum exactly, which is an advantage for the robust simulation of very small droplets. To validate the use of these methods for the computation of the instability, we have investigated in depth the linear stability theory. Good agreement is obtained between simulations and stability theory. We then report simulations of the non-linear development of the instability in 3D. We use boundary conditions that allow the study of the spatial development of the instability. The simulations show the convective character of the instability and the influence of small upstream perturbations on droplet formation.

View the extended summary