

Gretar Tryggvason: "Direct numerical simulations of multiphase flow"
Worcester Polytechnic Institute

Abstract:

Direct numerical simulations (DNS) are becoming a viable tool to understand finite Reynolds-number multiphase flows. The considerable numerical challenges include the extra complexity caused by the unsteady motion of a deforming phase boundary. The front tracking approach for DNS is discussed in detail. Recent results for buoyancy driven bubbly flows in vertical channels yield previously unexpected insight into the flow dynamics and into the importance of accurately accounting for bubble deformability.

Other examples discussed are simulations of boiling flows, of coalescence-driven regime transitions in channels, and of flows with chemical reactions. Challenges presented by more complex flows are discussed.

About the speaker:

Gretar Tryggvason is Professor and Head of the Department of Mechanical Engineering at the Worcester Polytechnic Institute. He received his doctorate from Brown University in 1985 and spent a year as a postdoctoral researcher at the Courant Institute. After fifteen years as a faculty member at the University of Michigan, he moved to WPI in 2000. He is a Fellow of the American Physical Society and of the American Society of Mechanical Engineers, an associate editor of the International Journal of Multiphase Flow, and the Editor-in-Chief of the Journal of Computational Physics.