

THE WILLIAM E. BOEING DEPARTMENT OF
AERONAUTICS & ASTRONAUTICS

... welcomes ...

GRETAR TRYGGVASON

UNIVERSITY OF NOTRE DAME

Direct Numerical Simulations of Complex Multiphase Flows

Direct numerical simulations (DNS), where every continuum length and time scale is fully resolved, allow us to follow the evolution of complex flows for sufficiently long time so that meaningful statistical quantities can be gathered. Results for relatively simple multifluid and multiphase systems with bubbles and drops in turbulent flows are now available, but new challenges are emerging. First of all, DNS of very large systems are yielding enormous amount of data that, in addition to providing physical insights, opens up new opportunities for the development of lower order models that describe the average or large-scale behavior. Recent results for bubbly flows and the application of statistical learning tools to extract closure models from the data suggest one possible strategy.

Secondly, success with relatively simple systems calls for simulations of more complex problems. Multiphase flows often produce features such as thin films, filaments, and drops that are much smaller than the dominant flow scales and are often well-described by analytical or semi-analytical models. Recent efforts to combine semi-analytical models for thin films using classical thin film theory, and to compute mass transfer in high Schmidt number bubbly flows using boundary layer approximations, in combination with fully resolved numerical simulations of the rest of the flow, are described.



WILLIAM E. BOEING
DEPARTMENT OF AERONAUTICS & ASTRONAUTICS
UNIVERSITY of WASHINGTON

Monday, May 8, 2017 @ 4:00pm
Johnson Hall. Rm 102 | UW Seattle

Visitor RSVP:
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THE WILLIAM E. BOEING DEPARTMENT OF **AERONAUTICS & ASTRONAUTICS**

... Distinguished Guest Speaker ...



GRETAR TRYGGVASON UNIVERSITY OF NOTRE DAME

*Viola D. Hank Professor
Chair, Aerospace & Mechanical Engineering*

Gretar Tryggvason is the Viola D. Hank professor at the University of Notre Dame and the chair of the Department of Aerospace and Mechanical Engineering. He received his PhD from Brown University in 1985 and was on the faculty of the University of Michigan in Ann Arbor until 2000, when he moved to Worcester Polytechnic Institute as the head of the Department of Mechanical Engineering. He moved to the University of Notre Dame in 2010. Professor Tryggvason is well known for his contributions to computational fluid dynamics; particularly the development of methods for computations of multiphase flows and for pioneering direct numerical simulations of such flows. He served as the editor-in-chief of the Journal of Computational Physics 2002-2015, is a fellow of APS, ASME and AAAS, and the recipient of several awards, including the 2012 ASME Fluids Engineering Award.

The William E. Boeing Chair's Distinguished Seminar Series brings scholars of national and international reputation who have made an impact in the field of aerospace engineering and beyond. This seminar series will cover a diversity of topics of current interest to those in academia, industry and the general public. It is our hope that these monthly seminars will encourage an exchange of ideas and bring aerospace engineering and science to the forefront.



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