The Department of Mechanical Engineering/College of Engineering and Applied Sciences

Stony Brook University

Mechanical Engineering Seminar

Faculty Candidate

Dr. Orlando Ayala, Ph.D.
University of Delaware

Lecture Title: Dispersed multiphase flow modeling: from environmental to industrial applications

Friday, March 1, 2013 at 2PM, Room 173 Light Engineering Building

Abstract

Multiphase flows are present in almost all processing technologies in many industries and in the environment. Everyday phenomena such as rain, snow, fog, blood flow, dust in air, sand motion at the beach due to the wind or the waves, pneumatic conveying systems, underground flow, or even cooking eggs in boiling water, just to name a few, are familiar examples of multiphase flows. Multiphase flows can be broadly classified as disperse or separated depending on their characteristics. Disperse flows consist of a carrier fluid and another(other) phase(s) of discrete elements such as droplets, bubbles, or particles. The study of such flows is not only very interesting but also very challenging. As numerical methods have become the 3rd pillar of research (being the other two, theoretical and experimental work), I have devoted my career to using and developing numerical schemes for large-scale domain and small-scale domain to study disperse flows. In this talk, I first review the current state-of-the-art computational techniques for dispersed multiphase flows and their strengths and limitations. In doing so, I will present several case studies of my work on modeling disperse flows ranging from research-oriented work on environmental problems to the study of real industrial problems. I will present my work on simulating some cases present in nature, such as warm rain initiation and porous media flow. I will also take you through some of my work implementing well-known commercial software to solve important industrial problems involving multiphase flows—on the base of which a number of process improvements were proposed for a number of industries. I will also identify promising new opportunities for future research in the disperse flow area throughout my talk.

Biography

Dr. Orlando Ayala is currently a postdoctoral researcher at University of Delaware and Associate Professor at Universidad de Oriente, Venezuela. He earned his bachelor's degree in mechanical engineering from Universidad de Oriente in 1995, and his MS (2001) and PhD (2005) in mechanical engineering from the University of Delaware. Dr. Ayala's general research interests are multiphase flows, turbulent flows, transport of particles in fluid flows, compressible flows, heat transfer, numerical modeling, and high performance parallel computing and scientific computation. He has published more than 30 peer-reviewed publications and his work has been presented in several international forums in Austria, USA, Venezuela, Japan, France, Mexico, and Argentina. Over the past 5 years he has an average citation per year of all his published work of 21. He has had industrial work experience working for consulting companies in Venezuela, being involved in 20 different engineering projects. In addition, he has provided service to professional organizations such as ASME where he is currently a member of the Committee of Spanish Translation of ASME Codes and the ASME Subcommittee on Piping and Pipelines into Spanish.

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