Center for Environmental & Applied Fluid Mechanics

"Recent Developments in Measuring the Smallest Velocity Scales"

Prof. Philippe Bardet
George Washington University
Mechanical and Aerospace Engineering

Abstract: The velocity length-scales at interfaces are often the smallest encountered in many flows. They drive important phenomena, such as skin friction, heat and mass transfers, etc. For example, in high-Reynolds number wall-bounded flows the viscous wall unit can be on the order of the micrometer along the hull of ships or in the core of nuclear reactors; in some boiling conditions, micro-layers can be only a few micrometers thick. Historically, it has been challenging to directly probe flows in such conditions, which has led to much empiricism in numerical models.

This presentation will present recent developments in optical diagnostics to measure wall shear and flows in the direct vicinity of walls. The developments include the extension of molecular tagging velocimetry (MTV) to measure instantaneous wall shear stress in high-Reynolds number flows, the adaptation of Fourier integral microscopy (FIMic) to MTV and particle tracking velocimetry, and the generalization of FIMic to plenoptic 3.0.

Fall 2024 CEAFM Seminar Series

October 11, 2024 ✖ 3:00 PM ✖ Gilman 132