The Center for Fluid Mechanics
and
The Fluids, Thermal and Chemical Processes Group
of
The Division of Engineering
Seminar Series

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Advances in the Computation of Turbulent Reactive Flows

Turbulent reactive flows are prevalent in combustion, the chemical process industry and elsewhere. Predictive computational tools are sought to aid in the design of reactive-flow devices, to improve performance, and to shorten the design cycle. But the physics and chemistry of turbulent reactive flows is challenging: turbulence causes substantial property fluctuations over a broad range of scales; and the chemical reaction rates are typically complex, non-linear functions of the thermochemical properties. Several recent advances have facilitated the modeling and computation of turbulent reactive flows. In PDF methods, the turbulent fluctuations are fully represented through the joint probability density function (PDF) of the thermochemical and flow variables, for which a modeled transport is solved by a particle method. Various dimension reduction schemes have been developed to simplify the chemistry, and storage-retrieval algorithms have been developed which greatly reduce the computational cost of implementing chemical reactions. Some calculations of turbulent flames are presented to illustrate the capabilities of these computational methodologies.

Tuesday – April 20, 2004
Barus & Holley, Room 190
4:00 pm