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MMM SEMINAR *NCAR*

Interfacial Layers in High-Re Turbulence-Physics and Simulations

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Where turbulent flows with or without mean shear are adjacent to regions of very weak turbulence, such as boundary layers wakes, jets, and plumes, or convective layers, quasi-continuous interfacial layers tend to form that separate the turbulent and non-turbulent regions. Measurements and computations show that the mean and variance profiles of velocity and scalars have common global features, such as the outward 'boundary entrainment velocity' and discontinuities of the Reynolds stresses. These features vary depending on the strength of the shear. Microscale vortices are common to most interfacial layers. These results can be explained in terms of key mechanisms, including instabilities, shear sheltering, and nibbling/engulfment, and energy transfer dynamics in the vicinity of the interfaces. Improvements in parameterizations and in under -resolved simulations are emerging.

Computations by Ishihara and Kaneda on the Earth Simulator at R_λ greater than 1000 and laboratory turbulence at Cambridge at R_λ up to 450 show how similar thin-layers occur intermittently in the interior of turbulent flows. But there are some important differences. Detailed analysis of the data and a rapid distortion model shows how the eddies impact on the layers leads to a net down scale transport, peak dissipation and microscale velocities of the order of the rms velocities in the layers. Some of the statistics are consistent with Kolmogorov theory.

******PLEASE NOTE SPECIAL DAY AND TIME******

Friday, 1 March 2013, 11:15 AM
Refreshments 11:00 AM
NCAR-Foothills Laboratory
3450 Mitchell Lane
Bldg 2 Auditorium, Room 1022

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