Boulder Fluid Dynamics Seminar Series

Tuesday, April 1, 2014
3:30pm-4:30pm (refreshments at 3:15pm)
Bechtel Collaboratory in the Discovery Learning Center (DLC)
University of Colorado at Boulder

High-Resolution Direct Numerical Simulations of Stratified Turbulence in the Troposphere and Stratosphere

Joe Werne,
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Stratified turbulence in the troposphere and stratosphere is inherently episodic and inhomogeneous, fundamentally challenging attempts to understand, predict, and parameterize its behavior and impacts. It plays an important role in index-of-refraction fluctuations that affect laser communication and laser sighting systems. In this talk I describe simulations we are currently conducting of canonical atmospheric shear- and gravity-wave-induced turbulence processes, both separately and in combination, in an attempt to develop parameterization schemes for larger-scale models that cannot resolve their detailed dynamics.

Unsteady Loading of an Ocean Current Turbine in a Tidal Channel

Spencer Alexander and Peter Hamlington,
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As ocean current turbines move from the design stage into production and installation, a better understanding of both oceanic turbulent flows and localized loading is needed by researchers and members of industry. Modeling of realistic ocean turbulence in Large-Eddy Simulations (LES) of ocean turbines is essential for obtaining accurate ocean turbine loading and characteristics. In this study, tidal channel environments in which ocean current turbines are expected to operate are simulated using the National Center for Atmospheric Research (NCAR) LES model. Comparisons are first made between the LES results and available measurements from Puget Sound, and further flow-field characteristics are then presented, including vertical profiles of Reynolds stresses, anisotropy, turbulent loading, and two point correlations. Finally, the effects on unsteady loading of channel depth, tidal velocity, waves, wind speed, thermal stability, and turbine height are discussed.