Date: **March 12th**

Time: **11:00 AM**

Location: **Ames 234**

Speaker: **Dr. Pablo Huq**
College of Marine Studies, University of Delaware

Title: **"Dissipation Rate Correction Methods"**

Abstract

Dissipation rates of the turbulent kinetic energy and of the scalar variance are underestimated when the measurement resolution of the small scales of a turbulent flow field are insufficient. Results are presented of experiments conducted in a salt-stratified water tunnel [Schmidt number ~ 700]. Dissipation rates are determined to be underestimated, and thus correction techniques based on velocity structure functions and mixed-moment functions are proposed. Dissipation rates in laboratory experiments of shear-free, grid-generated turbulence are determined from balance calculations of the kinetic energy and scalar variance evolution equations. Comparisons between the structure function and balance estimates of dissipation show that the corrections are O(1) for the kinetic energy dissipation rate, and are O(100) for the scalar variance dissipation rate. This difference is due to the lack of resolution down to the Batchelor scales that is required for a high Schmidt number flow. Simple correction functions based on microscale Reynolds numbers are developed for both turbulent kinetic energy and scalar variance dissipation rates. Application of the technique to the results of laboratory experiments of density stratified turbulence, sheared turbulence, and sheared density stratified turbulence yields successful corrections. It is also demonstrated that the Karman-Howarth equality that relates second and third order velocity structure functions to dissipation rates is valid for both unstrained (decaying grid-generated turbulence) and density stratified and sheared turbulence at least up to the magnitudes of strains of the current experiments Nt~10, St~10 respectively.