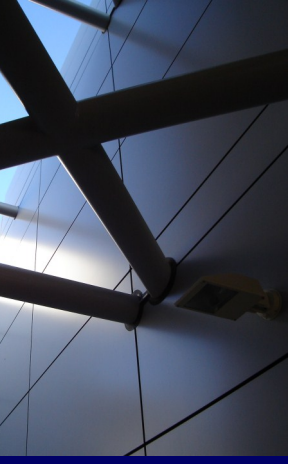

COLLOQUIUM
MECHANICAL ENGINEERING

The Department of Mechanical Engineering presents:

Sutanu Sarkar, Ph.D.

Chair and Professor, Mechanical and Aerospace Engineering Department
University of California, San Diego

Friday, February 17, 2012
11:10AM-12:00PM
Bourns Hall A265

Numerical simulations as process studies of ocean turbulence: two case studies

Abstract

Vertical mixing, essential to maintain the fluxes of nutrients and the temperature/salinity structure of the ocean, is thought to originate at boundaries. With the advent of increasingly powerful computational resources, the scope and accuracy of turbulence resolving simulations as environmental process studies has seen rapid progress. We will discuss two case studies. The first is an upper ocean problem that concerns the vertical structure of the Equatorial Under Current (EUC) system, an important oceanic component of the El Nino/ La Nina oscillation. Ocean observations show intermittent and vertically coherent patches of turbulence in the undercurrent, despite the stability of the local background, along with internal wave signals. Our simulations show similar coherent patches of turbulence and help explain their origin. The second case study involves the conversion of barotropic surface tides to larger amplitude internal waves (the so-called internal tides) at rough, bottom topography. Observations suggest hot spots of mixing where the slope angle is critical, that is equal to the internal wave propagation angle. Through simulations, we examine the critical slope case and show the existence of thick regions of stratified turbulence at sloping topography that are qualitatively different from thin turbulent boundary layers on a non-sloping bottom.

Biography

Sutanu Sarkar received his B. Tech from IIT Bombay, M. S. from Ohio State University and Ph. D. from Cornell University. After a position at ICASE, NASA Langley Research Center, he joined UCSD where he is the Blasker Professor of Engineering and the Chair of the department of Mechanical and Aerospace Engineering. His primary research interests are in the areas of simulation and modeling of turbulent flows, transport and mixing in the environment, and energy. He has received a NASA group achievement award (1994), the Bessel Award from the Humboldt Foundation (2001), and was elected Fellow, American Physical Society (2006), Associate Fellow, AIAA (2009) and Fellow, ASME (2010).