Commonwealth Center for Coastal Physical Oceanography
Old Dominion University
Spring 2013 Seminar Series

"MODELING OF LANGMUIR CIRCULATION: PROPER ORTHOGONAL DECOMPOSITION AND TRIPLE DECOMPOSITION OF THE CRAIK – LEIBOVICH MODEL"

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CCPO

Monday, March 18, 2013
3:30 PM
Room 1202, Engineering and Computational Sciences Building

Abstract

It is well known that wind-wave interaction can lead to the formation of longitudinal coherent structures known as Langmuir circulation. By increasing turbulent kinetic energy close to the surface and increasing average vertical flow velocities, Langmuir circulation has a homogenizing effect on the water column that is very significant in the context of heat and mass transfer. However, the time and length scales of the traditional wall turbulence, which are used to scale the majority of turbulence models, do not govern these structures, making most turbulence models unable to properly predict the structure of a flow presenting Langmuir cells. In this study, we use proper orthogonal decomposition to extract coherent structures from the turbulent background and examine how the fluctuating energy is redistributed in the flow when Langmuir circulation occurs. A framework using a triple decomposition in place of the classic Reynolds Average Navier Stokes is then suggested.

Biography

Guillaume Martinat is a postdoctoral researcher at CCPO. He graduated with a M.Sc in Applied Physics from the Université de Rennes 1, France and a D.Sc in Fluid Dynamics from the Université de Toulouse, France. His research interests include turbulence modeling, geophysical fluid dynamics, and unsteady separated flows.

Reception before seminar at 3:00 PM