Weekly CEAFM Seminar: Spring 2017

JOHNS HOPKINS
Center for Environmental
& Applied Fluid Mechanics

Date: **Friday, May 5, 2017**

Time: 11:00 AM

Location: Gilman Hall # 132

Speaker: **Dr. Tihomir Hristov** (Johns Hopkins University)

"Dynamic Balances in a Wavy Boundary Layer"

Abstract

More than half of the power used for stirring the global ocean comes from the atmosphere. While the exchange of momentum and kinetic energy between these two media is essential for generating surface waves and currents as well as for maintaining the ocean circulation patterns, discerning the mechanisms of exchange has remained a longstanding challenge. Over several decades, the research effort on the problem of wind waves generation has employed theoretical, empirical and numerical approaches with inconclusive results. As these approaches are concerned with the same physical process in the same media, they all should offer a description of the process and media that are consistent with each other. Yet so far different approaches have developed independently and any possible connection between them has remained largely unexplored. Here, from a minimal set of plausible assumptions, we analyze the energy and momentum balances in the atmospheric boundary layer over the ocean waves and use the results to present a mechanistic perspective on the suitability and the challenges before of the empirical and numerical methods of studying wind-wave interaction. The explicit forms of the wind input to the waves offer a dynamic argument rather than a dimensional hypothesis on how the wave spectrum scaling is maintained in equilibrium.