Coast to Cosmos Lecture Series

Interaction of Fine Sediments and Wave Boundary Layers: DNS and LES Study

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Digital Media Center 1034
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Abstract:

Understanding the state of the muddy seabed is critical to fine sediment transport, hydrodynamic dissipation, and seabed properties and thereby coast line evolution. However, its complete understanding is challenging due to uncertainties in the field such as intermittency of turbulence, sediment-induced density stratification, cohesion among small particles that form fluid-mud mixture. Fluid-mud mixtures at the sea bed mostly exist when the wave field is moderately energetic and the boundary layer experiences intermittently turbulent or transitional flows. For such flows, using Direct Numerical Simulations (DNS) is desired to capture turbulence. In this talk, the effect of sediment-induced stable density stratification due to dense deposits in the river mouths, i.e., high mud concentrations, and that due to comparably larger sediment particles in the fluid-mud mixture, i.e., particles with higher settling velocity, on flow turbulence through turbulence resolving simulations will be discussed. The available results can partly explain the wave energy dissipation and wave-supported gravity-driven flows. The current status of ongoing research on transitional flows in wave boundary layers and its comparison with the recent observations in the Louisiana Shelf, and future perspectives shall also be discussed.

Speaker's Bio:

Celalettin Emre Ozdemir is Assistant Professor in Civil & Environmental Engineering of LSU with joint appointment with CCT since August 2014. Dr. Ozdemir's research interests are mainly motivated to understand and predict environmental flows, sediment transport, and fluid structure interaction that have critical implications to evaluation and mitigation of coastal hazard, sustainable design and management practices. Particularly, he is interested in investigation of turbulent flow and sediment transport processes in marsh environments.

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