AEROSPACE & MECHANICAL ENGINEERING

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INFORMAL COFFEE PERIOD BEFORE THE SEMINAR IN ROOM 365, ENGR. BLDG.

UNIVERSITY OF NOTRE DAME, NOTRE DAME, INDIANA 46556

SPEAKER: **Erin Hackett**
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TOPIC: **FLOW AND TURBULENCE IN A COMBINED WAVE-CURRENT COASTAL OCEAN BOTTOM BOUNDARY LAYER**

DATE: Tuesday, January 26, 2010

TIME: 3:30 p.m.

PLACE: 138 DeBartolo Hall

ABSTRACT

Lack of detailed *in-situ* turbulence data within the inner part of combined wave-current boundary layers is a long-standing knowledge gap in analysis of coastal bottom boundary layers (BBL). Such data are essential for validation and improvement of circulation models in addition to the study of local phenomena, e.g. sediment transport. *In-situ* particle image velocimetry (PIV) measurements, at an unprecedented resolution of 3.5 Kolmogorov scales, were performed in the inner part of the BBL. They enable independent estimation of vertical profiles of flow and turbulence characteristics, such as Reynolds shear stress, shear production rate of turbulent kinetic energy, and the dissipation rate, which are compared to previous studies of steady turbulent boundary layers over rough-walls.

When the wave velocity and current are similar in magnitude, the mean velocity profile has an inflection point near the interface between current and wave boundary layers, indicating a region of flow instability. Scaling of these profiles based on log layer parameters works well only above this inflection. Instabilities associated with the inflection are manifested by peaks in turbulent shear production rate and a rapid increase in small-scale turbulence, as is evident from trends of the dissipation rate. Both the shear production peak and rapid increase in the dissipation rate occur at higher elevations than values in rough-wall steady boundary layers. The transition between current and wave boundary layers is also characterized by broad Reynolds stress peaks and a shear production rate exceeding the dissipation rate.

NOTE: ***If you are interested in meeting individually with Erin Hackett, please contact Evelyn at 631-5431***