Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Wave-Induced Pressure Under an Internal Solitary Wave and Its Impact at the Bed GUSTAVO RIVERA, PETER DIAMESIS, JAMES JENKINS, Cornell University, DIEGO BERZI, Politecnico di Milano — The bottom boundary layer (BBL) under a mode-1 internal solitary wave (ISW) of depression propagating against an oncoming model barotropic current is examined using 2-D direct numerical simulation based on a spectral multidomain penalty method model. Particular emphasis is placed on the diffusion into the bed of the pressure field driven by the wake and any near-bed instabilities produced under specific conditions. To this end, a spectral nodal Galerkin approach is used for solving the diffusion equation for the wave-induced pressure. At sufficiently high ISW amplitude, the BBL undergoes a global instability which produces intermittent vortex shedding from within the separation bubble in the lee of the wave. The interplay between the bottom shear stress field and pressure perturbations during vortex ejection events and the subsequent evolution of the vortices is examined. The potential for bed failure upon the passage of the ISW trough and implications for resuspension of bottom particulate matter are both discussed in the context of specific sediment transport models.

Gustavo Rivera
Cornell University

Date submitted: 09 Jul 2015 Electronic form version 1.4