Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Exact solutions for waves over periodic topography of arbitrary shape and amplitude[1] JIE YU, Department of Civil, Construction and Environmental Engineering, North Carlonia State University — Understanding the interaction of wave and seabed topography is important, due to its relevance to sediment transport and wave transformation in coastal oceans. For periodic topography of large amplitude, exact theoretical solutions are few, even for linear waves. Recently, Howard and Yu (2007, J. Fluid Mech.) have developed an exact theory for linear waves over large amplitude bottom corrugations, using a conformal transformation. A complete set of Floquet-type solutions is given, which are analogous to the families of propagating and evanescent modes over the flat bottom. The corrugations considered in Howard and Yu have a shape which is approximately sinusoidal at small amplitude and becomes increasing cusp-like as the amplitude increases. Here, we have extended the theory of Howard and Yu to consider periodic topographies of arbitrary shape and amplitude. Examples are shown for purely sinusoidal, doubly sinusoidal bottom undulations, and square-wave like bottom topography.

[1]This work is in collaboration with Louis N. Howard (MIT). JY is supported by National Science Foundation (Grant CBET-0845957).

Jie Yu
Dept of Civil, Construction and Environmental Engineering,
North Carlonia State University

Date submitted: 12 Aug 2011 Electronic form version 1.4