

Physical Mathematics Seminar

Generation of Sand Bars Under Surface Waves

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2:30 PM

Building 2, Room 338

Abstract

A quantitative theory is described for the evolution of sand bars under surface water waves and is shown to agree well with laboratory experiments. By assuming the slopes of the waves and seabed are comparably gentle, an approximate evolution equation is found for the seabed elevation. When wave reflection is significant, bars and waves interact through the Bragg scattering mechanism. Large regions exist where there is no change to the seabed. In addition to the effects of bedload considered before, it is found that suspended load has a significant effect on sand bar geometry when the seabed is composed of fine sediments. The effects of mean beach slope and narrow banded waves are also investigated. Results of recent sand bar experiments in a large wave flume will be presented, for fine and coarse sediment, large and small wave reflection, and for monochromatic and polychromatic waves. In particular, an experiment with a seabed initially consisting of a well mixed sand of two grain sizes demonstrates sediment sorting.



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