FMSP Lectures

Philippe Guyenne (Univ. of Delaware)

Water waves over a random bottom

August 7 (Wednesday) 16:00 ～ 17:00 Room 370

Abstract:

We present a Hamiltonian formulation for nonlinear surface water waves in the presence of a variable bottom. This formulation is based on a reduction of the problem to a lower-dimensional system involving boundary variables alone. To accomplish this, we express the Dirichlet-to-Neumann operator as a Taylor series in terms of the surface and bottom variations. This expansion is convenient for both asymptotic calculations and numerical simulations. First we apply this formulation to the asymptotic description of long waves over random topography. We show that the principal component of the solution can be described by a Korteweg-de Vries equation plus random phase corrections. We also derive an asymptotic expression for the scattered component. Finally numerical simulations will be shown to illustrate the theoretical results. This is joint work with Walter Craig and Catherine Sulem.