Water waves over irregular bottoms

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[1] IMPA

In this talk I will introduce the Dirichet-to-Neumann operator for the three-dimensional (3D) linear water wave problem. This non-local linear operator is constructed via a matrix decomposition in Fourier space. Through this operator the vertical structure of the harmonic velocity potential is captured, in a 3D domain with a highly variable bottom topography. The dynamics, in the numerical simulations, are therefore reduced to the two-dimensional free surface. Through a series of numerical simulations we show that this operator we can accurately capture linear wave propagation over highly irregular bottoms. The method is benchmarked with 2D examples where conformal mapping can also be used. Examples in 3D will be presented in particular the case of the Luneberg lens-like submerged mound.