PHYSICAL MATHEMATICS SEMINAR

Tidal Dissipation by Random Topography

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ABSTRACT:

The bottom of the ocean is often modeled as flat, yet, just like the surface of dry land, it is actually a landscape of small random bumps. Can this bumpiness affect the ocean circulation? We consider the possibility that it is important in dissipating the internal tide, by looking at how an internal wave is modified as it propagates over small-amplitude random topography. The solution for periodic topography is easy to derive and leads to energy focusing on a single characteristic trajectory; we show that in the random case the same focusing happens and is related to the properties of an underlying random attractor for the dynamical system describing the wave characteristics. We derive scaling laws for the energy dissipated by the topography, and show that these laws depend on the relationship between a critical length scale and the correlation scale of the topography. The topography in the ocean appears to be near this critical length scale, suggesting that tidal dissipation could be sensitive to the particular geometry of the bottom of the ocean.

TUESDAY, MARCH 16, 2010
2:30 PM
Building 2, Room 105

Refreshments at 3:30 PM in Building 2, Room 290
(Math Department - Common Room)

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