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Nonlinear Characteristics of Internal Wave Reflection from Sloping Topography BRUCE RODENBORN, DANIEL KIEFER, HEPENG ZHANG, HARRY L. SWINNEY, University of Texas at Austin — Internal waves are generated in the oceans by surface waves and abyssal tidal flow over the ocean floor. The interaction among these waves and their reflection from the ocean floor are believed to cause mixing necessary to support thermohaline circulation.[1] The reflection of internal waves is often treated as a linear or a weakly nonlinear and inviscid problem[2], but the full nonlinear effects generate higher harmonics and mixing. We use Particle Image Velocimetry to study the reflection of internal waves from a sloping bottom boundary in a laboratory tank. The experiments are modeled using a 2-D pseudo-spectral numerical simulation that solves the nonlinear problem in the Boussinesq approximation. The kinetic energy density of harmonics generated upon wave reflection from the boundary is examined as a function of the boundary angle and wave angle. Certain harmonics are found to be missing, in accord with recently derived selection rules.[3]

[1]W. Munk and C. Wunsch, Deep-Sea Res. I **45**, 1977-2010 (1998)
[2]T. Dauxois and W.R. Young, J. Fluid Mech. **390**, 271-295 (1999)
[3]C.H. Jiang and P.J. Marcus, preprint, (2008)

Bruce Rodenborn
University of Texas at Austin

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