Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Breaking of the internal tide KARL HELFRICH, Woods Hole Oceanographic Institution, ROGER GRIMSHAW, Loughborough University, EDWARD JOHNSON, University College London — Nonlinear steepening of low-mode internal tides and the subsequent arrest of steepening by non-hydrostatic dispersion is a common mechanism for the generation of internal solitary waves in the ocean. However, it is known that the earth's rotation may interfere and prevent the emergence of the solitary waves. The Ostrovsky equation, the Korteweg-de Vries equation with a nonlocal integral term representing the effects of rotation, is introduced as model for these processes. Recent work on a breaking criteria for the reduced Ostrovsky equation (in which the linear non-hydrostatic dispersive term with a third-order derivative is eliminated) is discussed. This equation is integrable provided a certain curvature constraint is satisfied. It is demonstrated, through theoretical analysis and numerical simulations, that when this curvature constraint is not satisfied at the initial time, then wave breaking inevitably occurs. The breaking criteria is applied to several oceanic examples including internal tides in the South China Sea and radiation of the internal tide from the Hawaiian Island chain.

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Date submitted: 02 Aug 2013 Electronic form version 1.4