Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Compression induced folding of a sheet: An integrable system HAIM DIAMANT, Tel Aviv University, THOMAS A. WITTEN, University of Chicago — The apparently intractable shape of a fold in a compressed elastic film lying on a fluid substrate is found to have an exact solution. Such systems buckle at a nonzero wave vector set by the bending stiffness of the film and the weight of the substrate fluid. Our solution describes the entire progression from a weakly displaced sinusoidal buckling to a single large fold that contacts itself. The pressure decrease is exactly quadratic in the lateral displacement. We demonstrate a subtle connection to the sine-Gordon problem, which reveals a new symmetry in the folding phenomenon.

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Date submitted: 18 Oct 2011 Electronic form version 1.4