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Phase space pattern formation: the single-wave model[1] P.J. MORRISON, University of Texas at Austin, N.J. BALMFORTH, University of British Columbia, J.-L. THIFFEAULT, University of Wisconsin — Pattern formation in physical systems has received considerable attention, much of which is based on Ginzburg–Landau type systems with advective and diffusive nonlinearity and dispersion. In contrast, the single-wave model (SWM), a Hamiltonian mean-field model, arises in many physical contexts that share common pattern forming behavior. Although the SWM was originally derived in nonlinear plasma theory, where it describes the behavior near threshold and subsequent nonlinear evolution of unstable plasma waves, it arises in fluid mechanics, specifically vortex dyanmics, and also applies to galactic dynamics, the XY and Potts models of condensed matter physics, and general long-range Hamiltonian mean field models. The SWM is a normal form equation for systems that transition to instability with modes emerging from a continuous spectrum (critical layers) and it describes there subsequent nonlinear behavior and pattern formation. This talk surveys SWM phenomena as described in a recent review article.[2]

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[2]N. Balmforth, P. J. Morrison, and J-L. Thiffeault, Reviews of Modern Physics, to appear (2012).

P. J. Morrison
University of Texas at Austin

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