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Internal modes of solitons of degenerately near-cubic NLS in 1D

For nonlinear dispersive PDE, the presence (or absence) of internal modes in the spectrum of the linearized operator around a soliton solution has implications for the long-time dynamics of general solutions close to the soliton (for its asymptotic stability, for example). Recent work of Martel, and of Rialland, studied the internal modes of solitons of near-cubic nonlinear Schrodinger equations in one dimension, and established their asymptotic stability. Here we extend this analysis of internal modes to a class of degenerate perturbations of the cubic not considered there, and realize this situation for some combined-power nonlinearities. This is joint work in progress with Yvan Martel.