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Nondegeneracy and Stability of Periodic Standing Waves in Fractional NLS Equations. Preliminary report.

In the stability and blowup for traveling or standing waves in nonlinear Hamiltonian dispersive equations, the nondegeneracy of the linearization about such a wave is of paramount importance. That is, one must verify the kernel of the second variation of the Hamiltonian is generated by the continuous symmetries of the PDE. The proof of this property can be far from trivial, especially in cases where the dispersion admits a nonlocal description where shooting arguments, Sturm-Liouville theories, and other ODE methods may not be applicable. In this talk, we discuss the nondegeneracy of the linearization associated to antiperiodic constrained energy minimizers in class of defocusing NLS equations with fractional dispersion. Key to our analysis is the development of a ground state theory and oscillation theory for linear periodic Schrodinger operators with antiperiodic boundary conditions. The antiperiodic nature of the problem greatly complicates the analysis, as even in the classical (local) case linear Schrodinger operators with periodic potentials need not have simple antiperiodic ground states. As an application, we obtain the nonlinear (orbital) stability of such antiperiodic standing waves with respect to antiperiodic perturbations. (Received September 21, 2015)