Generalized Korteweg-de Vries and Nonlinear Schrödinger: estimates and dynamics near solitons

One dimensional water waves are in a certain regime described by the Korteweg-de Vries equation. Such solitary waves had been observed by Russel in 1834 in a canal. The Korteweg-de Vries equation and the nonlinear Schroedinger equation have a remarkably rich structure. Their generalizations provide us with a playground where the interplay between nonlinearity and dispersive efects can be studied. The dynamics near solitary waves is of particular interest: In the subcritical regime solitary waves are stable, in the critical regime there is an interesting blow-up near the family of solitary waves. The supercritical range is largely open with strong evidence for asymptotically selfsimilar blow-up.

In the lecture series I will explain apriori estimates, stability and blow-up results.