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Integrability study of breaking-wave equations

There is considerable interest in the study of equations of the form $u_t - u_{txx} = f(u, u_x, u_{xx}, u_{xxx})$ that describe breaking waves. Two main examples in this class are the Camassa-Holm equation and the Novikov equation, both of which are integrable systems in the sense of having a Lax pair and a bi-Hamiltonian structure as well as hierarchies of local symmetries and local conservation laws. In this talk, I present results from a recent study of the integrability of two interesting new 1-parameter families of breaking-wave equations with power nonlinearities. One family contains the Camassa-Holm equation and the Novikov equation. The other family is a generalization of the Camassa-Holm equation analogous to the generalized KdV equation.