On the Nonlinear Variational Wave Equation

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We prove existence of a global semigroup of conservative solutions of the nonlinear variational wave equation $u_{tt} - c(u)(c(u)u_x)_x = 0$. This equation shares many of the peculiarities of the HunterSaxton and the CamassaHolm equations. In particular, the equation possesses two distinct classes of solutions denoted conservative and dissipative. In order to solve the Cauchy problem it is necessary to augment the equation properly in order to obtain a unique solution. In this talk we describe how this is done for conservative solutions. The equation was derived by Saxton as a model for liquid crystals. The talk is based on joint work with X. Raynaud.