

Nonlinear Partial Differential Equations

Boundary value problems and equations arising in fluid mechanics

The Camassa-Holm Equation — A Survey

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The Camassa-Holm equation $u_t - u_{xxt} + u_x + 3uu_x - 2u_x u_{xx} - uu_{xxx} = 0$ has received considerable attention since its discovery in 1993 thanks to its many intriguing mathematical properties, e.g., it is completely integrable and can be derived as a model for water waves. In particular, the solution of the Cauchy problem may bifurcate into two distinct solutions when the solution becomes singular, so-called wave breaking. We review the current understanding of this problem, with emphasis on the Lipschitz stability of the solution of the Cauchy problem. Extensions to a two-component generalization of the Camassa-Holm equation will also be discussed.

The talk is based on joint work with X. Raynaud, Sintef, and K. Grunert, Norwegian University of Science and Technology.