Nonlinear Partial Differential Equations

Boundary value problems and equations arising in fluid mechanics

Some recent advances in the study of peakons

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I will describe some new results on peakons (peaked solitons), obtained in collaboration with Jacek Szmigielski and with my students Marcus Kardell and Budor Shuaib. It will be shown how to find explicit formulas for the characteristic curves associated to multipeakon solutions of the Camassa–Holm, Degasperis–Procesi and Novikov equations, by viewing these curves as trajectories of "ghostpeakons" with zero amplitude. The methods developed for this purpose also turn out to be useful for obtaining solution formulas for multipeakon solutions of the Geng–Xue equation, a two-component generalization of Novikov's equation. We will also take a look at peakon–antipeakon solutions of Novikov's equation, which can display some very intricate and fascinating behaviour not seen in other peakon equations before.