On Multisoliton Solutions and Solitons Interactions

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Solitons are solutions of a variety of PDEs. They are characterized by well defined and constant shapes and speeds in the time and spatial variables. It is an interesting fact that depending on the initial conditions some of the well studied equations as KdV, modified KdV, sine-Gordon, nonlinear Schrödinger, and more can have N-soliton solutions, where N can be any natural number. The Hirota bilinear method, the inverse scattering transform, and Bäcklund transformations are well known iterative methods to obtain explicit multisoliton solutions. The nature of the resulting solutions do not reveal the interactions of the singular solutions. Very often the interactions of solitons of different speeds result only in shift of the phase of the different solitons.

In the talk we present a class of explicit and well defined N-soliton configurations to study the dynamics of the interactions of two or more solitons. The corresponding class of PDEs generating those type of solutions is discussed and relations to the KdV established.