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**Stability of the periodic Korteweg-de Vries equation**

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Soliton equations, i.e. completely integrable wave equations have been and still are of major interest to mathematicians and physicists. In this talk we will consider one of the prototype equations in soliton theory, the Korteweg–de Vries (KdV) equation.

A remarkable property of solitons is their stability against perturbations. It is well-known that a small initial perturbation of the constant solution of a soliton equation eventually splits into a number of stable solitons and a decaying background radiation component.

We will study the case where the constant background is replaced by a quasi-periodic one. That is, we will consider the long-time asymptotics of the periodic KdV equation under a short range perturbation. The astonishing observation is that the perturbed periodic KdV solution splits asymptotically into a number of solitons plus a radiation part that does not decay as in the case of constant background. Rather it appears as a modulation of the quasi-periodic solution.

To obtain the long time asymptotics one reformulates the inverse spectral problem as a Riemann–Hilbert problem defined on the underlying hyperelliptic curve and finally applies the method of nonlinear steepest descent.