Stability of the Periodic Toda Lattice under a Short Range Perturbation

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The Toda lattice is a model of a nonlinear one-dimensional crystal, which has the special feature of being completely integrable. The case of periodic initial conditions can be explicitly being solved in terms of Riemann theta functions on the underlying hyperelliptic Riemann surface.
Here we are interested in short range perturbations of such solutions. Existence of solutions will be established via the inverse scattering transform and the long time asymptotics will be tackled by a reformulation as a Riemann-Hilbert problem on the underlying Riemann surface.

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