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The Miura Map, KdV, and Inverse Scattering

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Abstract

This talk concerns recent work with Thomas Kappeler, Mikhail Shubin, and Peter Topalov, and work in progress with Rostyslav Hryniv and Yaroslav Mykytyuk. I'll describe an inverse scattering method for singular potentials on the line (say H^{-1} potentials with some additional decay at infinity) which recovers the logarithmic derivative of zero energy solutions (which are one order less singular than the potential) from scattering data. The Miura map, a nonlinear mapping of functions on the line that takes solutions of the mKdV equation to solutions of the KdV equation, plays an important role. The goal of this work is to implement an inverse scattering method for KdV with singular initial data.