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DK Seminar

December 17, 2014, 14:00 - 15:30
University of Vienna,
Faculty of Mathematics, OMP 1, HS 2

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On the Riemann–Hilbert problem for the Korteweg–de Vries equation with rarefaction initial data

We study the Korteweg-de Vries (KdV) equation $q_t = -q_{xxx} + 6qq_x$, with steplike initial data of the form $q(x) \rightarrow 0$ as x goes to infinity and $q(x) \rightarrow c_- > 0$ as x goes to minus infinity, with first moment finite, a.e.

$$\int_0^\infty (1 + |x|)(|q(x)| + |q(-x) - c_-|)dx < \infty.$$

Therefore we use the Inverse Scattering Transform (IST) and consider the inverse scattering problem. Following Deift and Zhou ('93), we formulate the inverse problem as a Riemann–Hilbert problem and solve it, using the nonlinear steepest descent method together with a so called "g-function". To solve this RH–problem we use conjugation and deformation to obtain a model problem, which can be solved with the Sokhotski-Plemelj formula.