

ANALYSIS SEMINAR

October 19, 2012

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Title: Construction of a Sturm–Liouville vessel using Gelfand–Levitan theory. Solution of the Korteweg–de Vries equation on the half-line.

Abstract: Using Gelfand–Levitan theory on a half-line, we construct a vessel for the class of potentials, whose spectral functions satisfy a certain regularity assumption. When the singular part of the spectral measure is absent, we construct a canonical model of the vessel. Finally, evolving the constructed vessel, we solve the Korteweg–de Vries equation on the half-line, coinciding with the given potential for $t = 0$. It is shown that the initial value for $x = 0$ is prescribed by this construction, but can be perturbed using an “orthogonal” to the problem measure.

The results, presented in this work

1. include formulas for the ingredients of the Gelfand–Levitan equation,
2. are shown to be general in the sense that NLS, Canonical systems and many more equations can be solved using theory of vessels, analogously to Zacharov–Shabat scheme,
3. present a generalized inverse scattering theory on a line, using pre-vessels.