Abstract

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"Initial/Boundary Value Problems in Soliton Theory:
Admissible Data for the Unified Scattering Method"

Initial/boundary value problems for 1-dimensional 'completely integrable' equations (NLS, KdV, Sine-Gordon, etc.) can be studied via an extension of the inverse scattering method, which is due to Fokas and his collaborators. A crucial feature of this method is that it requires the values of more boundary data than given for a well-posed problem. In the particular case of cubic NLS, for example, knowledge of the Dirichlet data suffices to make the problem well-posed but the Fokas "unified" method also requires knowledge of the values of Neumann data. The study of the Dirichlet to Neumann map is thus necessary before the application of the unified method. In recent work with Dimitra Antonopoulou, we provide a rigorous study of this map for a large class of decaying Dirichlet data. We show that the Neumann data are also sufficiently decaying and hence rigorously justify the applicability of the unified method. In a sense we rigorously prove the complete integrability of the Initial/Boundary Value Problem.

References:

1. Nonlinearity 28 (2015) 3073-3099

2. Nonlinearity 29 (2016) 3206-3214