SEMINARIO

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Nonlinear Schrödinger equation on the half line: analysis and numerical solution

Abstract: We consider the NLS equation with a cubic nonlinearity posed on the positive semi-axis. In the defocusing case, we prove that if the Dirichlet data has a sufficient polynomial decay then the Neumann data also has a proper decay so that the Fokas method is applicable. We also provide a proof of the solution's convergence in the L^4 space-norm to zero at infinite times which demonstrates the absence of solitons for this case. In the focusing case, decay of the Neumann data is derived when the Dirichlet data are properly decaying, but only under the assumption of decay of the solution as t tends to infinity. A Crank-Nicolson finite differences nonlinear scheme is introduced for the numerical solution, with experimental rates of convergence of order 2. Numerical simulations are presented for the soliton propagation with various initial conditions.

The results are joint with Spyros Kamvissis.

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