Analysis Seminar

Low-Regularity Solutions of the Nonlinear Schrödinger Equation on the Spatial Quarter-Plane

By

Türker Özsarı
(Bilkent University)

Abstract: In this talk, we will discuss (Hadamard) well-posedness for the nonlinear Schrödinger equation posed on the spatial quarter-plane with a power-type nonlinearity. We take initial data in L2-based Sobolev spaces as in the study of dispersive PDEs posed on the whole space. The suitable spaces for the boundary data, which are not a priori known, turn out to be certain modifications of Bourgain spaces.

Nonhomogeneous initial-boundary value problems in multidimensional frameworks have not been well understood, for instance, the half-plane case was treated only recently. It turns out the quarter-plane problem is a truly two-dimensional boundary value problem, in the sense that there is a boundary point along both spatial directions. This motivates the use of an entirely new approach for initial boundary value problems which involves analyzing the weak solution formula for the forced linear quarter-plane problem directly. Another difficulty in this problem is the presence of a corner along the boundary. This requires one to establish analogs of certain results in Sobolev space theory. Finally, it is worth noting that here we assume data are of low regularity. Therefore, we prove Strichartz-type estimates in the setting of a boundary value problem.

This is a joint work with D. Mantzavinos (University of Kansas).

Date: Monday, May 6, 2024
Time: 15:30-16:30
Place: SA141 - Mathematics Seminar Room