

COUNTEREXAMPLES FOR HIGH-DEGREE ANALOGUES OF THE SCHRÖDINGER MAXIMAL OPERATOR

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In 1980 Carleson posed a question: what is the minimal regularity of an initial data function in a Sobolev space that implies pointwise convergence for the solution of the linear Schrödinger equation? After progress by many authors, this was recently resolved (up to the endpoint) by Bourgain, who constructed counterexamples to deduce a necessary condition on the regularity, and Du and Zhang, who proved a sufficient condition. Over the past decades, many authors have also studied the analogue of Carleson's question for other dispersive PDEs. In this talk we describe a new flexible number-theoretic method for constructing counterexamples, which proves a necessary condition for high-degree analogues of the Schrödinger maximal operator to be bounded from H^s to local L^1 . In particular, the necessary condition we prove pushes s above a long-standing barrier at $1/4$.