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FAKULTÄT FÜR MATHEMATIK
Dekan Univ.-Prof. Dr. Christian Krattenthaler

Einladung zur öffentlichen Defensio von

Ziping RAO MSc

Thema der Dissertation:

Optimal Blowup Stability for the Energy Critical Wave Equation

Abstract:
We study the stability of ODE blowup solutions of wave equations with power nonlinearity in the lightcone. Perturbing around the ODE blowup solution, we obtain a nonlinear wave equation with a time-dependent self-similar potential. In order to handle this potential, we introduce similarity coordinates, under which we rewrite the equation into an autonomous evolution equation. We first recall some stability results in higher regularity by Donninger and Schörkhuber. They use the Lumer–Phillips theorem to obtain a solution semigroup to the Cauchy problem. Then by the Gearhart–Prüss theorem they obtain enough decay of the semigroup to control the nonlinearity.
For the energy critical equation in the energy space, the semigroup does not have enough decay to control the nonlinearity. For this we need the help of Strichartz estimates. By constructing an explicit expression of the semigroup, we establish these estimates, and moreover improve the energy bound from the Gearhart–Prüss theorem. Following the pioneering work of the three dimensional case by Donninger, we are able to obtain energy critical blowup stability in five dimensions.

Prüfungssenat:

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