

Global Solutions for 5D Quadratic Fourth-Order Schrödinger Equations

Ebru Toprak

Yale University

We prove small data scattering for the fourth-order Schrödinger equation with quadratic nonlinearity

$$i\partial_t u + \Delta^2 u + \alpha u^2 + \beta \bar{u}^2 = 0 \quad \text{in } \mathbb{R}^5$$

for $\alpha, \beta \in \mathbb{R}$. We extend the space-time resonance method, originally introduced by Germain, Masmoudi, and Shatah, to the setting involving the bilaplacian. We show that under a smallness condition on the initial data measured in a suitable norm, the solution satisfies $\|u\|_{L_x^\infty} \lesssim t^{-\frac{5}{4}}$ and scatters to the solution to the free equation. Although our work builds upon an established method, the fourth-order nature of the equation presents substantial challenges, requiring different techniques to overcome them.

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