Existence of maximizers for Airy-Strichartz inequalities

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Resumo

Recently, in a joint work with Ademir Pastor, we give a simple proof of the classical well-posedness result for the generalized KdV equation proved by Kenig, Ponce and Vega. The key ingredient in the proof is the following Airy-Strichartz estimate

$$\|U(t)u_0\|_{L_x^{5k/4} L_t^{5k/2}} \leq C_k \|u_0\|_{\dot{H}_x^{s_k}},$$

where $k > 4$, $s_k = (k-4)/2k$ and $U(t)$ denotes the linear propagator for the KdV equation. Our goal here is to prove the existence of maximizers for the above inequality. The main tool we use is a linear profile decomposition for the Airy equation with initial data in $\dot{H}_x^{s_k}$. As a consequence, we also establish the existence of maximizers for a general class of Strichartz type inequalities associated to the generalized KdV equation.