AN APPLICATION OF $L^p - L^q$ DECAY ESTIMATES TO THE SEMILINEAR WAVE EQUATION WITH A STRUCTURAL DAMPING

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In this talk we first derive some $L^q - L^q$ high frequencies estimates, $q \in (1, \infty]$, for the wave equation with a structural damping

$$u_{tt} - \triangle u + 2a(-\triangle)^\sigma u_t = 0\,, \qquad u(0,x) = u_0(x)\,, \quad u_t(0,x) = u_1(x)\,.$$

Combining them with some $L^1 - L^q$ low frequencies estimates and using Duhamel's principle, we may study the global existence of the solution to

$$u_{tt} - \triangle u + 2a(-\triangle)^\sigma u_t = |u|^p\,, \qquad u(0,x) = u_0(x)\,, \quad u_t(0,x) = u_1(x)\,,$$

with small data $(u_0, u_1) \in (H^2 \cap H^{1,p} \cap H^{1,p'}) \times (H^1 \cap L^p \cap L^{p'})$.