

# DECAY RATES FOR WAVE MODELS WITH STRUCTURAL DAMPING

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ABSTRACT. In this talk, we will present results on the behavior of higher order energies of solutions to the following Cauchy problem for a wave model with structural damping:

$$u_{tt} - \Delta u + b(t)(-\Delta)^\sigma u_t = 0, \quad u(0, x) = u_0(x), \quad u_t(0, x) = u_1(x), \\ \sigma \in (0, 1], \quad b(t) = \mu(1+t)^\delta, \quad \mu > 0, \quad \delta \in [-1, 1].$$

We are interested in the influence of the structural dissipation (between external and visco-elastic damping)  $b(t)(-\Delta)^\sigma u_t$  on  $L^2 - L^2$  estimates.

*Our main goal is to study under which conditions do we have a parabolic effect for the solutions, that is, the decay rates depend on the order of energy.*

In the talk we will explain how *hyperbolic* or *elliptic* WKB analysis comes in. The main tools are a correct division of the extended phase space into zones, diagonalization procedures, construction of fundamental solutions and a gluing procedure. Some open problems complete the talk.

Lu/Reissig, *Rates of decay for structural damped models with decreasing in time coefficients*, 30 A4, submitted.

Lu/Reissig, *Rates of decay for structural damped models strictly increasing in time coefficients*, in preparation.

This is joint work with Xiaojun Lu (Hangzhou).