ON THE ASYMPTOTIC BEHAVIOUR OF SECOND ORDER EVOLUTION EQUATION

Abstract. In this talk, we discuss decay estimates for solutions to the abstract second order evolution model:

$$\Lambda_1 u_{tt}(t,x) + \Lambda_2 u(t,x) + \Lambda_3 u_t(t,x) = 0, \qquad (t,x) \in (0,\infty) \times \mathbf{R}^n \tag{1}$$

with suitable initial data

$$u(0,x) = u_0(x), \quad u_t(0,x) = u_1(x) \qquad x \in \mathbf{R}^n, \tag{2}$$

where Λ_i are positive self-adjoint pseudo differential operators. In addition, by taking the Fourier transform, we assume that (1) can be written in the form:

$$\hat{u}_{tt}(t,\xi) + A^2(\xi)\hat{u}(t,\xi) + B(\xi)\hat{u}_t(t,\xi) = 0, \tag{3}$$

for suitable functions $A^2(\xi)$ and $B(\xi)$. Initially, we shall discuss the punctual estimates in the Fourier space. Thereon, will be presented a new classification to equation (1) based on the asymptotic behaviour of the correspondent equation in Fourier space. Finally, we obtain sharp $L^p - L^q$ decay rates for u and u_t. Worth to mention that we achieve such result without an explicit formula for representing the solution of equation (3) - why this matter?

In a forthcoming talk we shall briefly discuss some methods to prove optimal decays rates for (1) and some news concerning this topic.

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