A NEW APPROACH TO $\sigma-$EVOLUTION MODELS WITH LOW REGULAR TIME DEPENDENT COEFFICIENTS

Abstract. In this talk, we disscus decay estimates for solutions to the $\sigma-$evolution model:

$$u_{tt}(t,x) + a^2(t)A^\sigma u(t,x) + b(t)A^\theta u_t(t,x) = 0, \qquad (t,x) \in (0,\infty)\times \mathbf{R}^n \tag{1}$$

with suitable initial data

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

in which $A := -\Delta$, $\sigma > 0$, $\theta \in [0,\sigma]$.

Initially we shall consider the case $b = 0$, and explore the relationship between the coefficient $a^2(t)$ and the decay structure of equation (1). Should the regularity be important? Or even blow up is possible? For this sake, we shall review some results in the literature, such [4] and [5].

After the introduction, we discuss our new results ([2] and [3]) for the case $a^2(t) = 1$ with low regular b, that is, we don't assume any control of $\frac{d}{dt}b$, a relevant difference in comparison with other works, such [1]. Our new approach provide an answer to an important conjecture [6] concerning equation (1).

In the last part of the talk we shall address the new problem that we are currently working: the case $\theta = 0$, $a^2(t) \neq 1$ and $b(t) > 0$, with both being low regular coefficients. Shall the regularity be important?

Be welcome to explore the influence (or not) of the regularity of coefficients in σ - evolution equations!

Authors. (1) Edson Cilos Vargas Júnior. *Universidade Federal de Santa Catarina.*

E-mail: *science.edson@gmail.com*

(2) Cleverson Roberto da Luz. *Universidade Federal de Santa Catarina.*

E-mail: *cleverson.luz@ufsc.br*

References.

(1) D'Abbicco, M; Ebert, M. R.; *A classification of structural dissipations for evolution operators*, Math. Methods in the Appl. Sci., (2015). DOI: 10.1002/mma.3713.

(2) Vargas Júnior, E. C.; da Luz, C. R.; *$\sigma-$evolution models with low regular time-dependent non-effective structural damping* (accepted for publication - asymptotic analysis).

(3) Vargas Júnior, E. C.; da Luz, C. R.; *$\sigma-$evolution models with low regular time-dependent effective structural damping* (in preparation).

(4) Hirosawa, F. *Energy estimates for wave equations with time dependent propagation speeds in the Gevrey class.* J. Differential Equations 248 (2010), 29722993.

(5) Reissig, M.; Smith, J. *$L^p - L^q$ estimate for wave equation with bounded time-dependent coefficient.* Hokkaido Math. J. 34/3 (2005), 541586.

(6) Wirth, J. *On the influence of time-periodic dissipation on energy and dispersive estimates.* Hiroshima Math. J. 38 (3) (2008), 397410.