Universidade Federal de Santa Catarina
Centro de Ciências Físicas e Matemáticas
Pós-Graduação em Matemática

Seminars on Differential Equations (2018.1)

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Optimal decay rates for a Timoshenko system in bounded domain

Abstract

We consider a bar of length L. Denoting by $\phi(x,t)$ the vertical displacement of the equilibrium state and $\psi(x,t)$ the rotation angle of a transversal section, the Timoshenko system we will study is given by the equations:

$$\begin{aligned} &\rho_1\phi_{tt} - \kappa_1(\phi_{xx} + \psi_x) = 0, \\ &\rho_2\psi_{tt} - \kappa_2\psi_{xx} + \kappa_1(\phi_x + \psi) - \kappa_0\psi_{txx} = 0. \end{aligned} \tag{1}$$

The initial data are

$$\phi(x,0) = \phi_0(x), \quad \phi_t(x,0) = \phi_1(x), \quad \psi(x,0) = \psi_0(x), \quad \psi_t(x,0) = \psi_1(x), \tag{2}$$

for $x \in]0, L[$, and we consider the following boundary conditions:

$$\phi(0,t) = 0, \quad \phi(L,t) = 0, \quad \psi_x(0,t) = 0, \quad \psi_x(L,t) = 0.$$

The main goal of this work is to find optima decay rates for the solutions of the system (1)-(2).

References:

1. J. E. M. Rivera and R. Racke, *Global stability for damped Timoshenko systems*, Discrete Contin. Dyn. Syst. 9 (2003), 1625–1639.

2. H. P. Oquendo and P. S. Pacheco, *Optimal decay for coupled waves with Kelvin-Voigt damping*, Appl. Math. Lett. 67 (2017), 16–20.

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Room 202 - Maths Department

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