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NONEXISTENCE SOLUTIONS OF A LOGARITHMIC NONLINEAR KIRCHHOFF EQUATION WITH DELAY

Erhan Pişkin[1], Hazal Yüksekkaya[1] and Nadia Mezouar[2,3]

[1] Department of Mathematics
Dicle University, Diyarbakir, Turkey
(E-mail: episkin@dicle.edu.tr, hazally.kaya@gmail.com)

[2]Department of Economics Sciences
University of Mascara, Mascara, Algeria
[3]Analysis and Control of PDE's Laboratory , Sidi Bel Abbes, Algeria
(E-mail: nadia.mezouar@univ-mascara.dz)

Abstract. The topic's paper is on a delayed logarithmic nonlinear Kirchhoff equation. Under suitable conditions on the initial data, nonlinear source and the damping's weights with and without delay, blows up results have been given.

Keywords. Non degenerate Kirchhoff equation, Local existence, Blow up, Delay term.

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1 Introduction

Kirchhoff equation is among the famous wave equation's model which describe the transverse vibration of a stright fixed in this endded. It has been introduced in 1876 by Kirchhoff [5] and it is more general than D'Alembert equation. In one dimensional space it takes the following form:

$$\frac{\partial^2 u}{\partial t^2} - \left(\frac{P_0}{\rho h} + \frac{E}{2L\rho} \int_0^L \left| \frac{\partial u}{\partial x}(x,t) \right|^2 dx \right) \frac{\partial^2 u}{\partial x^2} = 0, \qquad (1)$$

where the function $u(x,t)$ is the vertical displacement at the space coordinate x varying in the segment $[0,L]$ and the time $t>0$, ρ is the mass density, h is the area of the cross section of the string, P_0 is the initial tension on the string, L is the length of the string and E is the Young's modulus of the material. The nonlinear coefficient

$$C(t) = \int_0^L \left| \frac{\partial u}{\partial x}(x,t) \right|^2 dx,$$