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EXPONENTIAL STABILITY OF NON-UNIFORM EULER-BERNOULLI BEAM WITH A INDEFINITE DAMPING UNDER A FORCE CONTROL IN VELOCITY AND ANGULAR VELOCITY

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Abstract: In this paper we study the Riesz basis property and the exponential stability of a damped Euler-Bernoulli beam system with variables coefficients. The beam is clamped at one end and controlled at the free end by a force control in velocity and angular velocity. The exponential stability of the system is obtained using the Riesz basis approach.

Keywords and Phrases: Euler-Bernoulli beam, C_0-semigroups, exponential stability, Riesz basis.

2020 Mathematics Subject Classification: 34A12, 34A34, 34A45, 47H10.

1. Introduction

We study the fundamental Riesz Basis Property and the exponential stability of a damped flexible Euler-Bernoulli beam. The beam is clamped at one end and controlled at the free end by a control force in velocity and angular velocity. The vibrations are described by the following system :

$$m(x)y_{tt} + (EI(x)y_{xx})_{xx} + \gamma(x)y_t = 0, \quad 0 < x < 1, t > 0, \tag{1}$$