
Exponential Stability Result for an Euler-Bernoulli Beam Equation with Internal Damping, an Internal Delay Term, and Boundary Damping

Boubacar DIAO

Université Cheikh Anta DIOP de Dakar, Sénégal, diaobacar@yahoo.fr.

Our study focuses on the exponential stability of an Euler–Bernoulli beam equation featuring internal damping, an internal delay term, and boundary damping. We first rigorously formulated the system using semigroup theory. Next, we investigated the system’s exponential stability by constructing two Lyapunov functionals. This process involved solving three inequalities with multiple unknowns, leading to relationships between the parameters (μ_2, β) and prompting an analysis of the stability region in the (β, μ_2) parameter space where the system is exponentially stable. Finally, we examined the system’s exponential decay rate, λ^* .