Dynamic boundary control of a flexible beam with a tip body: stability and simulations

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Abstract

An Euler-Bernoulli beam under dynamic feedback control at the boundary has been considered. It is shown that if the controller is positive definite, energy functional of the system dissipates in time. For the case when controller is linear, system is asymptotically but not exponentially stable which follows from spectral analysis of the system operator. However, in the nonlinear case the asymptotic stability has been demostrated only for classical solutions, due to more complex methods for proving the precompactness of trajectories. Additionally, a dissipative finite element method, based on a Crank-Nicolson time discretization is constructed, and a-priori error estimates are stated.

References

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