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Uniform stabilisation for a finite difference of the 1-d Timoshenko system*

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Abstract

We consider some numerical schemes for the Timoshenko system with dissipative boundary conditions allowing the exponential stability and observability. It is known that for semi-discrete schemes obtained with finite difference or the standard finite element method there is not necessarily a uniform bound and therefore these numerical schemes are generally not observable for the limit $h \rightarrow 0$. This lack of boundary observability also happens to dissipative system in our study when the velocities of wave propagations are the same. However, we prove that there exists a subspace of solutions generated by the low frequencies of the discrete system where the numerical solutions are uniformly observable. Here we consider only the case in finite-difference and our proof relies on the method of numerical multipliers.

Key words: Timoshenko system; semi-discretizations; observability.

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