

## Global Asymptotic Stabilisation of an Active Mass Damper for a Flexible Beam .

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*Abstract:* In this paper, a finite dimensional approximated model of a mechanical system constituted by a vertical heavy flexible beam with lumped masses placed along the beam and a mobile mass located at the tip, is proposed; such a model is parametric in the approximation order, so that a prescribed accuracy in the representation of the actual system can be easily obtained with the proposed model. The system itself can be understood as a simple representation of a building subject to transverse vibrations, whose vibrating modes are damped by a control action performed at the top by means of a mobile mass. A simple PD control law, which requires only the measurement of the position and velocity of the mobile mass with respect to the end-point of the beam, is shown to globally asymptotically stabilise all the flexible modes considered in the approximated model, regardless of the chosen approximation order, under a technical assumption that is satisfied in many cases of practical interest. Simulation runs confirm the effectiveness of the proposed control law in achieving both position regulation of the mobile mass and vibration control.

*Keywords:*

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