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Frequency domain modeling of nonlinear end stop behavior in Tuned Mass Damper systems under single- and multi-harmonic excitations

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Abstract

Nonsmooth dynamics of a Tuned Mass Damper system with lateral stops are studied using an alternating frequency/time harmonic balancing (AFT-HB) method. To this end, an extremely stiff end stop nonlinearity is considered. The application range of AFT-HB is investigated by including up to 250 harmonics in the external force, as well as in the motion description. Numerical simulations are performed by making use of a Newmark time integration algorithm for numerical verification of the results. The results for single harmonic excitations are further verified with an existing pseudo-arclength path-following tool. Two excitation scenarios are considered: single harmonic- and a wide-spectrum excitation with uniform distribution and random phase correlation between the harmonics. The AFT-HB algorithm is

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