Nonlinear Beam with Additive L^2-Regular Random Noise

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ABSTRACT: We consider stability of a nonlinear elastic beam with and without random noise. As a main result we show that the expected energy is linearly bounded at time t in spite of the presence of additive L^2-regular space-time noise. Appropriate partial-implicit discretizations with similar qualitative behavior are discussed as well. The technique of Lyapunov-type functionals is exploited. We compare these results with those for the beam in a linear approximation. In the last case, the expected energy is growing linearly with time as well.

Key words and phrases. Nonlinear PDE, beam, stability, additive noise, Lyapunov function, expected energy growth, partial-implicit methods.