Finite Dimensional Attractor for a Nonlinear Beam Equation

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Abstract. In this work we study the existence of a global attractor for the nonlinear beam equation

$$\begin{cases} u_{tt} + \Delta^2 u + \alpha u - M(\|\nabla u\|_2^2)\Delta u + f(u) + g(u_t) = 0 \ \text{ in } \ \Omega \times \mathbb{R}^+, \\ u(x,0) = u_0(x), \quad u_t(x,0) = u_1(x), \ x \in \Omega, \\ u = \frac{\partial u}{\partial \nu} = 0 \ \text{ on } \ \Gamma, \end{cases}$$

where $\Omega \subset \mathbb{R}^n$ is a bounded domain with smooth boundary $\Gamma = \partial\Omega$, $\alpha > 0$, and M is a nonnegative function. The functions $g(u_t) \approx |u_t|^r u_t$ and $f(u) \approx |u|^\rho u$ are, respectively, dissipation and forcing terms.

References

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