DECAY RATES FOR A VISCOELASTIC WAVE EQUATION WITH BALAKRISHNAN–TAYLOR AND FRICTIONAL DAMPINGS

Baowei Feng — Yong Han Kang

ABSTRACT. In this paper we are concerned with a viscoelastic wave equation with Balakrishnan–Taylor damping and frictional damping. By using the multiplier method and some properties of convex functions, we establish general energy decay rates of the equation without imposing any growth assumption near the origin on the frictional term and strongly weakening the usual assumptions on the relaxation term. Our stability result generalizes the earlier related results.

1. Introduction

This paper is concerned with the following viscoelastic wave equation with Balakrishnan–Taylor and frictional dampings in $\Omega \times \mathbb{R}^+$,

$$
(1.1) \quad u_{tt} - \big(\xi_1 + \xi_2\|\nabla u\|^2 + \sigma(\nabla u, \nabla u_t)\big)\Delta u
$$
$$
+ \int_0^t \operatorname{div}[a(x)g(t-s)\nabla u(s)]\,ds + \eta(t)b(x)h(u_t) = |u|^\rho u,
$$