New decay rates for Cauchy problem of Timoshenko thermoelastic systems with past history: Cattaneo and Fourier law

Mounir Afilal[1], Baowei Feng[2], and Abdelaziz Soufiyane[3]

[1]Faculté Polydisciplinaire de Safi, Universite Cadi Ayyad
[2]Southwestern University of Finance and Economics
[3]University of Sharjah

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Abstract

In this paper, we investigate the decay properties of the thermoelastic Timoshenko system with past history in the whole space where the thermal effects are given by Cattaneo and Fourier laws. We obtain that both systems, Timoshenko-Fourier and Timoshenko-Cattaneo, have the same rate of decay (1+t)ˆ{-(1/4)} and the regularity-loss type property is not present in some cases. Moreover, new stability number χ is introduced, such new number controls the decay rate of the solution with respect to the regularity of the initial data. To prove our results, we use the energy method in Fourier space to build an appropriate Lyapunov functionals that give the desired results.

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