

Dynamic Analysis of Differential Systems with Infinite Memory and Damping

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Abstract : In this work, we are concerned with the dynamic behaviors of solutions to some coupled systems with infinite memory, which consist of two partial differential equations where only one partial differential equation has damping. Such coupled systems are good mathematical models to describe the deformation and stress characteristics of some viscoelastic materials affected by temperature change, external forces, and other factors. By using the theory of operator semigroups, we give wellposedness results for the Cauchy problem for these coupled systems. Then, with the help of some auxiliary functions and lemmas, which are specially designed for overcoming difficulties in the proof, we show that the solutions of the coupled systems decay to zero in a strong way under a few basic conditions. The results in this dynamic analysis of coupled systems are generalizations of many existing results.

Keywords : dynamic analysis, coupled system, infinite memory, damping.

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