A structurally damped σ-evolution equation with nonlinear memory

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Abstract

In this paper we investigate the global existence of small data solutions for the following structurally damped σ-evolution model with nonlinear memory term % \[u_{tt}+(-\Delta)^\sigma u+\mu(-\Delta)^{\frac{\sigma}{2}}u_t=\int_0^t (1+\tau)^{-\gamma}|u_t(\tau,\cdot)|^p\,d\tau,\] % with σ>0. In particular, for $\gamma\in ((n-\sigma)/n,1)$ we find the sharp critical exponent, under the assumption of small data in˜L^1. Dropping the˜L^1 smallness assumption of initial data, we show how the critical exponent is consequently modified for the problem. In particular, we obtain a new interplay between the fractional order of integration˜$1-\gamma$ in the nonlinear memory term, and the assumption that initial data are small in˜L^m, for some˜$m>1$.

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