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Superstability of Semigroups

We discuss semigroups that decay faster than any exponential exp(-ωt). In particular, we answer a question of A. V. Balakrishnan from 2005 by providing elementary physical examples of superstability which are not of the type of extinction-in-finite-time (i.e., not nilpotent). These examples are less artificial (in the context of semigroup theory) than those given by G. Lumer in 2001/2002 or by F. Udwadia in 2005.