MEMORY RELAXATION OF THE CAHN-HILLIARD EQUATION

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Abstract. We consider the memory relaxation of the one-dimensional Cahn-Hilliard equation endowed with the no-flux boundary conditions. The resulting integrodifferential equation is characterized by a memory kernel which is the rescaling of a given positive decreasing function. The Cahn-Hilliard equation is then viewed as the formal limit of the relaxed equation, when the scaling parameter (or relaxation time) ε tends to zero. In particular, if the memory kernel is the decreasing exponential, then the relaxed equation is equivalent to the standard hyperbolic relaxation. The main result of this work is the existence of a family of robust exponential attractors for the one-parameter dissipative dynamical system generated by the relaxed equation, which is stable with respect to the singular limit $\varepsilon \to 0$. This theorem is obtained as a nontrivial application of a recent authors' abstract result.

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