

Longterm dynamics of a conserved phase-field system with memory

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We consider a phase-field model based on hereditary constitutive equations for the internal energy and the heat flux and on the assumption that the spatial average of the order parameter χ is conserved. This model consists of a parabolic integrodifferential equation for the (relative) temperature ϑ coupled with a nonlinear fourth-order evolution equation for χ . We first show that the obtained system is indeed a nonautonomous dynamical system, provided that the phase space accounts for the past history of ϑ and appropriate boundary conditions are given. Then we establish the existence of an absorbing set which is uniform with respect to the heat supply varying in a suitable metric space. Finally, we prove that our dissipative dynamical system possesses a uniform attractor of finite Hausdorff and fractal dimensions