



ONE-DIMENSIONAL OPTIMAL CONTROL PROBLEMS FOR TIME-DISCRETE CONSTRAINED QUASILINEAR DIFFUSION EQUATIONS OF ALLEN–CAHN TYPES

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Abstract. In this paper, we consider a class of optimal control problems for a one-dimensional time-discrete constrained quasilinear diffusion state-systems of singular Allen–Cahn types and its regularized approximating problems. We note that the control parameter for each system is given by physical temperature. The principal part of this paper is started with the verification of a Key-Theorem dealing with the decompositions of the subdifferentials of the governing convex energies of the state-systems. On this basis, we will prove five Main Theorems, concerned with: the solvability and precise regularity results of state-systems; the continuous-dependence of the solutions to state-systems including convergences in spatially C^1 -topologies; the existence and parameter-dependence of optimal controls; the necessary optimality conditions for approximate optimal controls; precise characterizations of the approximating limit of the optimality conditions.

Communicated by Toyohiko Aiki; Received September 12, 2021.

AMS Subject Classification: 35K59, 35K67, 35K87, 49J20.

Keywords: optimal control problems, time-discrete, Allen–Cahn type, quasilinear diffusion equations, regularized approximating problems, necessary optimality conditions; limiting optimality condition