

OPTIMAL CONTROL PROBLEMS FOR 1D PARABOLIC STATE-SYSTEMS OF KWC TYPES WITH DYNAMIC BOUNDARY CONDITIONS

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Abstract. In this paper, we consider a class of optimal control problems governed by 1D parabolic state-systems of KWC types with dynamic boundary conditions. The state-systems are based on a phase-field model of grain boundary motion, proposed in [Kobayashi–Warren–Carter, *Physica D*, 140, 141–150, 2000], and in the context, the dynamic boundary conditions are supposed to reproduce the transmitted heat exchanges between interior and boundary of a polycrystal body. Under suitable assumptions, the mathematical results concerned with: the well-posedness of state-systems; the solvability and parameter-dependence in the class of our optimal control problems; and the first order necessary optimality conditions in regular cases of problems and the limiting approach to the singular case; will be obtained in forms of three Main Theorems of this paper.

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