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Enrique Fernández-Cara. *Optimal control problems for a phase change model.*

In this work are treated some optimal control problems for a phase field model for solidification involving different kinds of restriction. This model describes phase change of metallic alloys, i.e, it allows two different kinds of crystallization; each of them is described by its own phase field function. To represent this model it is used a system of coupled non linear parabolic equations. In this system the first equation is for the temperature and the second and third equations are for the phase-field functions.

Here the main interest is to obtain the existence of a minimum and the optimality conditions for a cost functional involving the solution and the non homogeneity of the phase field model. Besides, some of optimal control problems has different restrictions for the control function or for the state functions or both of them. To obtain the existence of a minimum for the cost functional it is used minimizing sequences and to obtain the optimality conditions to the control problems it is used the Dubovitskii-Milyutin formalism. (Received May 15, 2013)