Hintermüller, M.; **Hinze, M.**; **Tber, M. H.**

An adaptive finite-element Moreau-Yosida-based solver for a non-smooth Cahn-Hilliard problem. (English) Zbl 1366.74070

Optim. Methods Softw. 26, No. 4-5, 777-811 (2011).

Summary: An adaptive finite-element semi-smooth Newton solver for the Cahn-Hilliard model with double obstacle free energy is proposed. For this purpose, the governing system is discretized in time using a semi-implicit scheme, and the resulting time-discrete system is formulated as an optimal control problem with pointwise constraints on the control. For the numerical solution of the optimal control problem, we propose a function space-based algorithm which combines a Moreau-Yosida regularization technique for handling the control constraints with a semi-smooth Newton method for solving the optimality systems of the resulting sub-problems. Further, for the discretization in space and in connection with the proposed algorithm, an adaptive finite element method is considered. The performance of the overall algorithm is illustrated by numerical experiments.

MSC:

74S05 Finite element methods applied to problems in solid mechanics
74N20 Dynamics of phase boundaries in solids
74M05 Control, switches and devices (“smart materials”) in solid mechanics

Keywords:

double obstacle free energy; Moreau-Yosida regularization technique; semi-smooth Newton method; optimal control

Software:

iFEM

Full Text: DOI

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