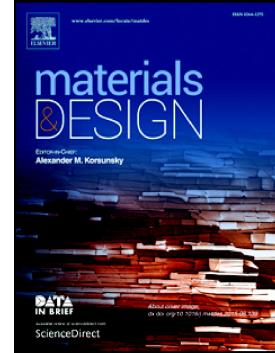


Accepted Manuscript

A novel Level-Set Finite Element formulation for grain growth with heterogeneous grain boundary energies.

Julien Fausty, Nathalie Bozzolo, Daniel Pino Muñoz, Marc Bernacki



PII: S0264-1275(18)30752-4
DOI: doi:[10.1016/j.matdes.2018.09.050](https://doi.org/10.1016/j.matdes.2018.09.050)
Reference: JMADE 7411
To appear in: *Materials & Design*
Received date: 26 July 2018
Revised date: 17 September 2018
Accepted date: 28 September 2018

Please cite this article as: Julien Fausty, Nathalie Bozzolo, Daniel Pino Muñoz, Marc Bernacki , A novel Level-Set Finite Element formulation for grain growth with heterogeneous grain boundary energies.. Jmade (2018), doi:[10.1016/j.matdes.2018.09.050](https://doi.org/10.1016/j.matdes.2018.09.050)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

A novel Level-Set Finite Element formulation for grain growth with heterogeneous grain boundary energies.

Julien Fausty, Nathalie Bozzolo, Daniel Pino Muñoz, Marc Bernacki

MINES ParisTech, PSL Research University, CEMEF Centre de mise en forme des matériaux, CNRS UMR 7635, CS 10207 rue Claude Daunesse, 06904 Sophia Antipolis Cedex, France

Abstract

Grain growth is a ubiquitous thermally activated mechanism by which the microstructures of crystalline materials coarsen at relatively high temperatures. Individual grain boundaries in a material microstructure have their own structure and their own behavior and, as such, uniform grain boundary energy modelling approaches arrive at their predictive limits when it comes to certain types of local phenomena (abnormal grain growth, thermal twinning, etc). This work presents a new heterogeneous grain boundary energy formulation for grain growth built on the thermodynamics of the phenomenon that can handle high grain boundary energy gradients. Using a full field finite element numerical framework it verifies the precision and convergence of this new formulation.

Keywords: grain growth, grain boundary energy, finite element, level-set, triple junction, modelling

Email address: julien.fausty@mines-paristech.fr (Julien Fausty)

Download English Version:

<https://daneshyari.com/en/article/11029847>

Download Persian Version:

<https://daneshyari.com/article/11029847>

[Daneshyari.com](https://daneshyari.com)