Application of the Level Set Method for the Visual Representation of Continuous Cellular Automata Applied in Anisotropic Wet Etching

C. Montoliu[a], N. Ferrando[b], J. Cerdá[a], R. J. Colom[a]

[a]*Instituto de Instrumentación para Imagen Molecular (I3M). Centro mixto CSIC Universitat Politècnica de València CIEMAT, camino de Vera s/n, 46022 Valencia, Spain*
[b]*Centro de Física de Materiales, centro mixto CSIC-UPV/EHU and Donostia International Physics Center (DIPC) 20018 Donostia-San Sebastian, Spain*

Abstract

Atomistic models are a very valuable simulation tool related with material engineering. This is the case of the Continuous Cellular Automata (CCA), that allows to simulate accurately the process of chemical etching used in MEMS micromachining. Due to its atomistic nature, data representing has been usually problematic, showing the data as a point cloud most of the times. When using this models as a part of a CAD tool, good visualization of data is very important. In this paper, an implementation of the Level Set method for surface reconstruction related to MEMS engineering and a discussion of the capabilities of this model are presented.

Our implementation, based on a minimum energy model, is able to reconstruct the surface accurately using directly the model state. Some completely different topologies are presented, proving both the effectiveness of our implementation and how is capable of reconstructing any surface, both flat and non-linear surfaces. One interesting features of the model is the fact that can be easily parallelized. Some results of these simulations, as well as performance data, are given.

Keywords:
Level Set, Cellular Automata, Surface Reconstruction