

IMPLICIT REPRESENTATION OF BOUNDARIES USING LEVEL-SETS FOR TRANSIENT MACHINING APPLICATION

Hossein Asadi Kalameh^{1,2}, Olivier Pierard² and Eric Béchet¹

¹ LTAS - Department of Aerospace and Mechanical Engineering, Université de Liège
Chemin des chevreuils, 1, B-4000 Liège, Belgium
hossein.asadi@cenaero.be, eric.bechet@ulg.ac.be
<http://cg-dev.ltas.ulg.ac.be/~bechet/>

² Morfeo Team, Cenaero
Rue des Frères Wright 29, 6041 Gosselies - Belgium
olivier.pierard@cenaero.com <http://www.cenaero.be>

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This work aims at improving implicit representation of complex industrial work-pieces by reducing the existing gap between Computer Aided Design (CAD) and Computer Aided Engineering (CAE).

The proposed approach is based on the level-set technique [1]. Some novel results for accurate implicit representation of boundary include exact capture of sharp features as well as suitable approximation of curved boundaries for finite element computations [2]. This is done by detecting automatically geometrical points of the geometry and use this information in the implicit representation. Then, a Sweep Line Algorithm is used to subdivide the elements containing these geometrical points [3].

The method is general enough in order to describe automatically any arbitrary surface. All the developments are implemented in the commercial finite element package Morfeo. Numerous applications can benefit from these developments including Cartesian grid problems as well as crack propagation with the X-FEM method. In this presentation, application to transient machining simulations will be illustrated.

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