

Accepted Manuscript

Boolean operations on arbitrary polygonal and polyhedral meshes

Sâm Landier

PII: S0010-4485(16)30084-7

DOI: <http://dx.doi.org/10.1016/j.cad.2016.07.013>

Reference: JCAD 2454

To appear in: *Computer-Aided Design*



Please cite this article as: Landier S. Boolean operations on arbitrary polygonal and polyhedral meshes. *Computer-Aided Design* (2016), <http://dx.doi.org/10.1016/j.cad.2016.07.013>

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.

Boolean operations on arbitrary polygonal and polyhedral meshes.

Sâm Landier^{a,*}

^aONERA, 29 avenue de la Division Leclerc, 92320 Châtillon, France

Abstract

A linearithmic floating-point arithmetic algorithm designed for solving usual boolean operations (intersection, union, and difference) on arbitrary polygonal and polyhedral meshes is described in this paper.

This method does not dis-feature the inputs which can be two volume meshes, two surface meshes or one of each. It provides conformal meshes upon exit. It can be used in many pre- and post-processing applications in computational physics (e.g. cut-cell volume mesh generation or conservative remapping).

The core idea is to consider any configuration as a polygonal cloud. The polygons are first triangulated, the intersections are solved, the polyhedral cells are then reconstructed from the conformal triangles cloud and finally their triangular faces are re-aggregated to polygons. This approach offers great flexibility regarding the admissible topologies : non-planar faces, concave faces or cells and some non-manifoldness are handled. The algorithm is described in detail and some current results are shown.

Keywords: Boolean Operations, Polyhedral Meshes, Polygonal Meshes, Mesh Intersection, Cell Reconstruction, Conformity, Conservative Remapping, Cut-cell Meshing, Constrained Delaunay Triangulation, Flood Fill Algorithm.

1. Introduction

Considering two arbitrary polyhedral meshes M_1 and M_2 that are partially or fully overlapping (e.g. one is fully immersed in the other one, or both

*. Corresponding author

URL: sam.landier@onera.fr (Sâm Landier)

Download English Version:

<https://daneshyari.com/en/article/4952627>

Download Persian Version:

<https://daneshyari.com/article/4952627>

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