

图形、图像、模式识别

## 细分曲面求交裁剪算法研究

李涛<sup>1</sup>, 周来水<sup>2</sup>

1.苏州科技学院 数理学院, 江苏 苏州 215009

2.南京航空航天大学 CAD/CAM工程研究中心, 南京 210016

收稿日期 2008-6-5 修回日期 2008-8-7 网络版发布日期 2009-11-6 接受日期

**摘要** 基于细分曲面的参数化表示, 研究了细分曲面的精确求交、裁剪算法。首先对控制网格建立局部坐标系, 将细分曲面表示为一系列小的面片, 并对每个控制顶点赋予参数值。然后用改进的轮廓删除法细分控制网格, 在关联曲面间进行相交性检测, 得到近似交点及其参数值, 再用迭代法求得精确解。根据用户指定的裁剪区域确定交线的走向, 将被裁剪曲面的控制网格面分为保留面、裁剪面和删除面, 设置每个裁剪面的裁剪域, 从而实现细分曲面的精确裁剪。算例表明, 该方法简单、有效。

**关键词** [细分曲面](#) [求交](#) [裁剪](#) [参数化](#)

**分类号** [TP391](#)

## Research on intersection and trimming algorithms for subdivision surfaces

LI Tao<sup>1</sup>, ZHOU Lai-shui<sup>2</sup>

1.College of Mathematics and Physics, University of Science and Technology of Suzhou, Suzhou, Jiangsu 215009, China

2.CAD/CAM Engineering Research Center, Nanjing University of Aeronautics and Astronautics, Nanjing 210016, China

### Abstract

Based on parametrization representation of subdivision surfaces, precise intersection and trimming algorithms are put forward. A series of local coordinate systems are set up and the surface is divided into many small patches. Each control vertex relates to a series of local parameter coordinates in the coordinate system it belongs to. The meshes are splitting with revised skirt-removed subdivision approach and intersecting faces are found among related faces. Then initial intersections and their parameters are gotten based on the Divide-Conquer idea and precise results can be obtained with iteration method. According to the trimming region required, the direction of each intersect line is reset. The control mesh facets of the trimmed surface are classified into three types: reserved facets, trimmed facets and discarded facets. Trimming domain of the trimmed facets are set automatically. Examples indicate simpleness and efficiency of this method.

**Key words** [subdivision surfaces](#) [intersection](#) [trimming](#) [parametrization](#)

DOI: 10.3778/j.issn.1002-8331.2009.30.054

通讯作者 李涛 [xiaolide@126.com](mailto:xiaolide@126.com)

### 扩展功能

#### 本文信息

▶ [Supporting info](#)

▶ [PDF\(870KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

#### 服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

#### 相关信息

▶ [本刊中 包含“细分曲面”的 相关文章](#)

▶ [本文作者相关文章](#)

· [李涛](#)

· [周来水](#)