

Fast algorithm to split and reconstruct triangular meshes for real time applications

Gábor Fábián, Lajos Gergó

Department of Numerical Analysis, Faculty of Informatics Eötvös L. University, Budapest,
Hungary

robagnaibaf@gmail.com, gergo@inf.elte.hu

In this paper we show a fast and efficient algorithm for cut and split a triangular mesh by a plane, and fully reconstruct the cutting surface. After the cut some of new triangular meshes will be created at the same format as the input mesh. Our approach is not to use complex data structures, just a vertex stream and an index stream keeping the algorithm simple, and ensuring the wide range of usability. We suggest a model for describe the boundary of a solid mesh to obtain advantages as a consequence of geometric topology. If we suppose the streams satisfy some reasonable restrictions, we find our algorithm has linear time complexity including the precomputation, splitting section, reconstruction and the decomposition.

References

- [1] J. M. Lee. Introduction to Topological Manifolds. *Springer*, 2011
- [2] M. de Berg, O. Cheong, M. van Kreveld, M. Overmars. Computational Geometry - Algorithms and Applications. *Springer*, 2008
- [3] S. Ghali. Introduction to Geometric Computing. *Springer*, 2008
- [4] C. Mendoza, C. Laugier. Simulating Cutting in Surgery Applications using Haptics and Finite Element Models. *Proceedings of the IEEE Virtual Reality*, 2003
- [5] M. Szilvási-Nagy, I. Szabó. A Slicing Algorithm for Triangular Meshes. *6th International Conference on Applied Informatics Eger, Hungary*, 2004.