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Illustrative Membrane Clipping

1. Å. Birkeland¹,
2. S. Bruckner²,
3. A. Brambilla¹,
4. I. Viola^{1,3}

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Author Information

- 1 University of Bergen, Norway
- 2 Vienna University of Technology, Austria
- 3 Christian Michelsen Research, Norway

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- Abstract
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Abstract

Clipping is a fast, common technique for resolving occlusions. It only requires simple interaction, is easily understandable, and thus has been very popular for volume exploration. However, a drawback of clipping is that the technique indiscriminately cuts through features. Illustrators, for example, consider the structures in the vicinity of the cut when visualizing complex spatial data and make sure that smaller structures near the clipping plane are kept in the image and not cut into fragments. In this paper we present a new technique, which combines the simple clipping interaction with automated selective feature preservation using an elastic membrane. In order to prevent cutting objects near the clipping plane, the deformable membrane uses underlying data properties to adjust itself to salient structures. To achieve this behaviour, we translate data attributes into a potential field which acts on the membrane, thus moving the problem of deformation into the soft-body dynamics domain. This allows us to exploit existing GPU-based physics libraries which achieve interactive frame rates. For manual adjustment, the user can insert additional potential fields, as well as pinning the membrane to interesting areas. We demonstrate that our method can act as a flexible and non-invasive replacement of traditional clipping planes.

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