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Fast Contact Determination for Intersecting Deformable Solids

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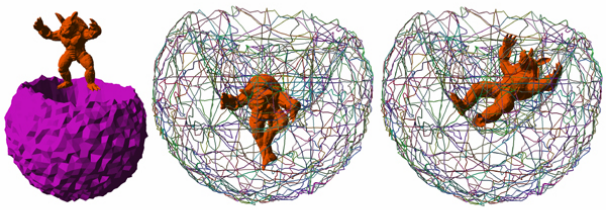

We present a fast contact determination scheme for intersecting deformable solids with detailed surface geometry. Given a high resolution closed surface mesh we automatically build a coarse embedding tetrahedralization and a partitioned representation of the surface in a preprocess. During simulation, the contact determination algorithm finds all intersecting pairs of deformed triangles using a memory-efficient barycentric bounding volume hierarchy, connects them into potentially disjoint intersection curves and performs a topological flood process on the exact intersection surfaces to discover a minimal set of contact points. A unique contact normal is computed for each contact volume, based on a continuous definition of surface normals, and used to find contact point correspondences suitable for contact treatment. The algorithm is strongly output-sensitive and we demonstrate robust contact determination at 60 frames per second for a pair of objects with 100K triangles in shallow intersecting contact.

http://dx.doi.org/10.2312/ceig.20151206

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