

REAL-TIME SIMULATION OF SOLIDS WITH LARGE VISCOPLASTIC DEFORMATION

Real-Time Live!

Research Project (Physics, Graphics, Modeling, etc.)

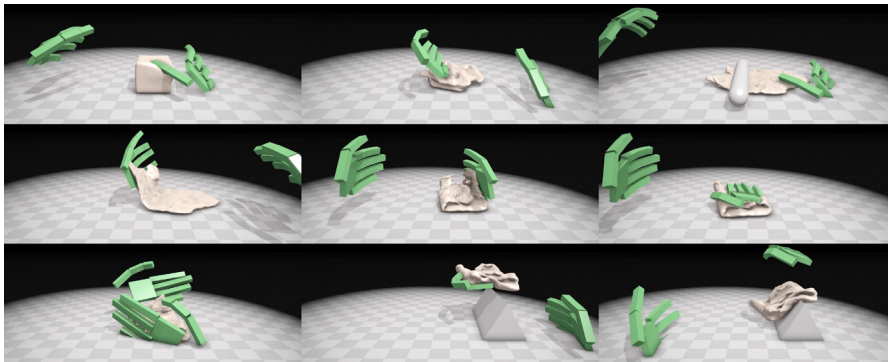
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This is the first demonstration of real-time solid simulation that can handle large plastic deformation. The new algorithm is implemented in NVIDIA Gameworks. The demo includes cutting, manipulating, and even blowing up dough of various shapes with several virtual tools controlled with a hand-tracking device.

Shape matching is a popular method for simulating deformable solids represented by particles. It is based on a compliant constraint formulation that is stable and efficient enough for real-time applications. Because it is a geometric method, it is well suited to simulation of elastic or nearly rigid materials where there is a well-defined goal configuration. While simulating elastic materials has been well explored, the added ability to simulate large plastic (permanent) deformation is necessary to simulate many real-world materials such as dough.

During simulation of plastically deforming solids, particles can spread apart, which creates under-sampled regions or over-sampled regions. This system ensures good particle distributions by seeding new particles and removing particles that are too close to others. Clusters that plastically deformed too much or have too many particles added or removed are deleted. Clusters are added when particles belong to too few clusters. A high-resolution visual mesh is skinned to the particles for rendering.

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