

Title: A High-Quality Physically-Accurate Visualization of the September 11 Attack on the World Trade Center

Abstract: We describe the efforts of a multidisciplinary team towards producing a visualization of the September 11 2001 Attack on the North Tower of New York's World Trade Center. The visualization was designed to meet two conditions. First, the visualization had to depict the impact with high fidelity, by closely following the laws of physics. Second, the visualization had to be eloquent to a non-expert user. This was achieved by first designing and computing a finite element analysis (FEA) simulation of the impact between the Boeing 767 and the top 20 stories of the building, and then by visualizing the FEA results with a state-of-the-art commercial animation system. The visualization was enabled by an automatic translator that converts the simulation data into an animation system 3D scene by removing simulation data with little visual relevance and by adding details important for the visualization that were ignored by the simulation. We built upon a translator developed part of our previous efforts to produce a high-fidelity visualization of the September 11 Attack on the Pentagon. The translator was extended to handle beam elements with a variety of complex profiles, to handle smoothed particle hydrodynamics (SPH) liquid representations, to enable and control visualization of fire and of disintegrating elements, and to better scale with the number of nodes and number of states.