

6.8 AIRCRAFT IMPACT MODELING

6.8.1 Component Level Analyses

Prior to conducting the full simulations of the aircraft impacting the towers, a series of smaller scale simulations was performed to develop understanding of how the aircraft and tower components fragmented and to develop the simulation techniques required for the final computations. These simulations began with finely meshed models of key components of the tower and aircraft structures and progressed to relatively coarsely meshed representations that could be used in the global models. Examples of these component-level analyses included impact of a segment of an aircraft wing with an exterior column, impact of an aircraft engine with exterior wall panels, and impact of a fuel-filled wing segment with exterior wall panels.

Figure 6–16 shows two frames from the last of these analyses, with the wing segment entering from the left, being fragmented as it penetrates the exterior columns, and spraying jet fuel downstream.

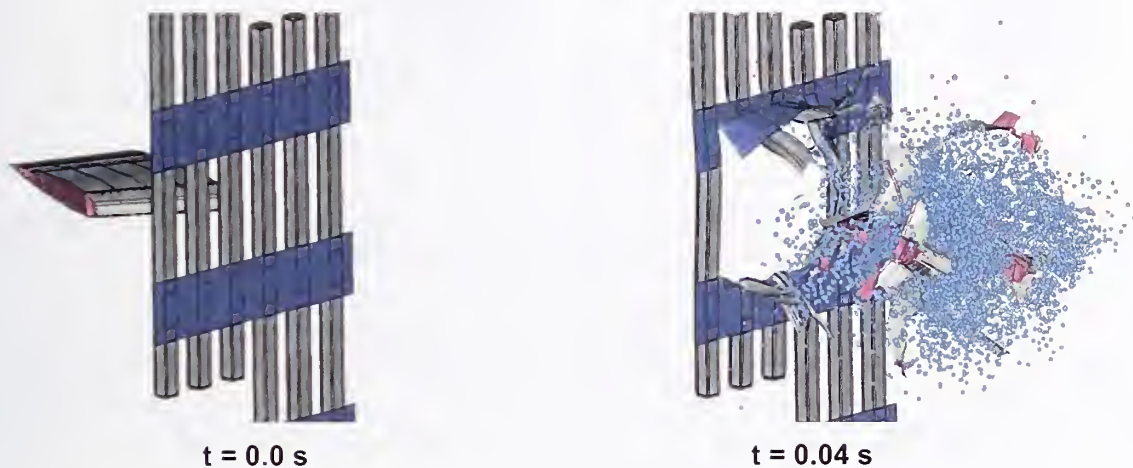


Figure 6–16. Calculated impact on an exterior wall by a fuel-laden wing section.

The Investigation Team gained valuable knowledge from these component impact analyses, for example:

- Moving at 500 mph, an engine broke any exterior column it hit. If the engine missed the floor slab, the majority of the engine core remained intact and had enough residual momentum to sever a core column upon direct impact.
- The impact of the inner half of an empty wing significantly damaged exterior columns but did not result in their complete failure. Impact of the same wing section, but filled with fuel, did result in failure of the exterior columns.