

Effect of erosion algorithm on breakup simulation of earth-covered magazine subjected to internal explosion

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An accidental detonation of ammunition magazine will lead to breakup of the structure and result in ejecting a large number of hazardous debris. Field tests are usually carried out to assess the hazard zone. To save cost, numerical simulation is often used to supplement the investigation. In this paper, study will focus on risk assessment of earth-covered magazine. It is based on previous successful simulation work by the authors. The concrete structure breakup is modeled through a kind of cohesive elements in conjunction with conventional Lagrangian solid elements. The air and explosive are modeled through Eulerian formulation. The covered soil on top of the roof slab and the around the side walls are modeled using Lagrangian elements. Since some of the soil elements are highly strained and distorted due to the explosive pressure, a kind of erosion algorithm has to be employed in order to avoid numerical instability. The challenge lies in adopting a set of suitable erosion criteria. It is vital to obtain reasonable results. This paper will present simulation results to show its effect on the breakup of the earth-covered magazine.

Keywords: numerical simulation, erosion algorithm, internal explosion, earth-covered magazine