

Debris Hazard of an Earth-covered Arch Shelter Subjected to Internal Explosion

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ABSTRACT

Arched-form shelters have been widely used for protecting on-land aircrafts and other military facilities. Over the arched structure, it is often further protected by a layer of soil cover, which is used to reduce the hazardous zone derived from debris due to accidental internal explosion, amongst other functions. The objective of this study is to quantify the debris hazard of a concrete earth-covered arch (ECA) shelter subjected to an accidental internal explosion. In order to reduce the amount of debris, hollow-cored arch shell is employed. Method of study is through numerical simulation. A mixed Lagrangian-Eulerian (ALE) Finite element model for multi-material was used. In it, the fluid-structure interactions between TNT, air and the concrete arch were included. Results of parametric studies on variations of TNT loading density and the thickness of soil cover are presented. The finite element ALE model is shown in Figure 1 below.

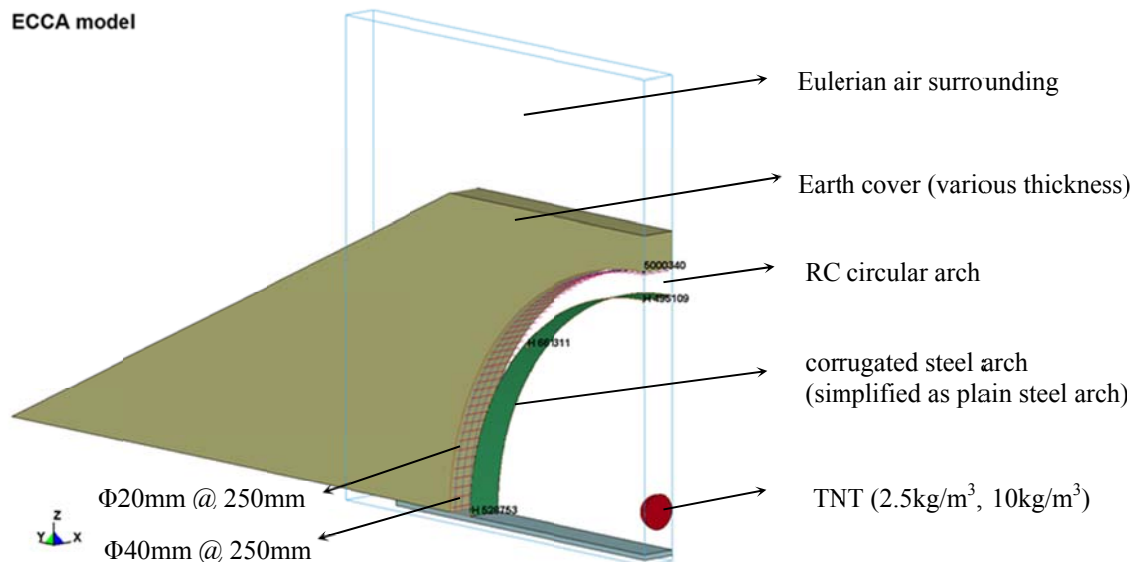


Fig. 1 Finite element ALE model of ECA under internal explosion

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