DYNAMIC FRAGMENTATION OF BLAST MITIGANTS

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ABSTRACT

Experimental evidence from a wide range of sources shows that the expanding cloud of explosively disseminated material comprises "particles" or fragments which have different dimensions from those associated with the original material. Powders and liquids have often been used to surround explosives to act as blast mitigants and this is the main driver for our research. There are also many other areas of interest where an initially intact material surrounding an explosive charge is dynamically fragmented into a distribution of fragment sizes. Examples of such areas include fuel air explosives (FAE) and thermobarics (TBX) as well as quasi-static pressure (QSP) mitigation systems and our studies are thus also relevant to these applications.

In this paper we consider the processes occurring as an explosive interacts with a surrounding layer of liquid or powder and identify why it is important to model these processes as a multiphase material problem as opposed to a continuum problem. We shall present results from this class of numerical modelling. In this paper we shall explore what determines the particle or fragment size distribution resulting from explosive dissemination of a layer of material and discuss reasons why clouds from disseminated liquids and powders look similar. We shall support our analysis with results from recent explosives trials and introduce early results from some ongoing small scale explosive mitigation experiments..