MODELLING OF ENHANCED BLAST AND HETEROGENEOUS EXPLOSIVES

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In recent years there has been a growing interest in a class of explosives aimed at providing enhanced blast as opposed to more conventional fragmentation effects. A common method of enhancing blast for a given mass of explosive is to make use of afterburning of fuel rich products in air. We shall briefly introduce a range of numerical modelling techniques necessary to simulate and investigate this class of explosive. Metals are common additives in enhanced blast formulations by virtue of their high heats of combustion. Even without them there is the potential for fuel rich gas phase combustion of the explosive products and we will introduce techniques we have used to model them. When we include metal particles we make the mixture even more heterogeneous and introduce a wide range of timescales associated with ignition, combustion and dispersion. We shall introduce these and highlight the challenges they pose for numerical modeling. The complex interaction of all these timescales and length scales requires the ability to model details of the detonation reaction zone through charge length scales to late time combustion. In many cases the data required for accurate submodels is still a subject of current research so strong links with experimental teams are required. We shall conclude by identifying our plans to address the many challenges remaining in this wide field.