MODIFICATION OF AIRBLAST FROM HIGH EXPLOSIVE EVENTS AT HIGH OVERPRESSURES

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Detonation of large yield high explosive (HE) charges produce pressure waveforms that are more representative of nuclear events. Computational predictions of a high explosive (HE) blast wave first reported by Brode.
At the lower range overpressure the agreement between HE and nuclear is quite good. However, this is not true at the higher levels because of the proximity of the HE contact discontinuity behind the shock front. Moreover, the pressure waveform has a flat topped appearance with a backward facing shock which differs from the triangular peaked nuclear waveform.

Numerical simulations suggest ways to make the HE high overpressure wave-forms agree more with nuclear. Design of the charge placement can modify the waveform at the high overpressure levels. Additionally, the front part of the HE waveform can be modified by wedges to produce a Mach stem. When
a blast wave intersect a ramp structure it produce a double Mach shock structure as shown by Kuhl. The concept has been called a height-of-burst (HOB) simulator since it tries to produce pressure waveforms that replicate those from a HOB.

Detailed computations have been carried out to predict the airblast generated from a large HE charge including modeling the unsteady detonation wave as it travels through the HE. Both the HULL code and the SAI code have been utilized to perform the simulations. Variations in charge geometry, charge density and container influence have been investigated. The use of concave and convex wedges have been used to obtain a shock structure that matches not only the front part of the nuclear waveform but also
the rear portion. This technique will allow testing of full-scale structures in the high overpressure regime.
Large scale modification of the blast wave is thus possible by modifying the charge placement and/or introducing a wedge angle. We show how these concepts can lead to higher fidelity simulation of blast effects.