

Abstract Submitted
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Enhanced Blast from Partial Reaction of a Solid Propellant

YEHUDA PARTOM, Retired — We performed tests with one of our propellants to determine its TNT equivalence. In these tests we measured the close in response with velocity gauges, and the blast effect at a distance of 10m. We expected the two diagnostics to agree, they did not. The velocity gauges show that only a small part reacts, but from the blast diagnostics it seems as if the whole propellant has reacted. We refer to this enhanced blast as a **spreading effect**. To demonstrate the spreading effect we make 1D simulations of outgoing detonations of an HB (H=HMX, B=Binder) explosive in spherical symmetry. For different runs we dilute the explosive with the binder to various extents, from $W=1$ (pure explosive) to $W=0.01$ (1% explosive). For each such formulation we compute the detonation parameters using our in house chemical equilibrium code. For each formulation we adjust the explosive radius so that the total detonation energy stays the same. For all runs we monitor the reflected pressure (P_r) at a radial distance of 12m. We get that as W decreases below 0.5, the total amount of HMX decreases, but P_r increases. For $W=0.01$, the total amount of HMX is only 6% of the amount for pure HMX, but P_r increases by 12% relative to that of pure HMX. We attribute the enhanced blast to the spreading effect.

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