MODELING OF BLAST ENHANCED EXPLOSIVES

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ABSTRACT

A theoretical model of detonation and combustion has been developed and implemented into a hydrocode. The model is based on the assumption that aerobic combustion, also called afterburn, is essentially controlled by mixing of the detonation products with air. To validate the model, simulations were compared to a firing trial in a closed detonation chamber. It was found that the model correctly covers the essential physics, and that it can be applied to conventional CHNO explosives as well as to a certain class of aluminized charges.

Finally, the model was applied to a free field detonation, to a mine blast simulation, and to a detonation at a tunnel entrance. In each case the simulation was run with and without considering aerobic combustion. Whereas aerobic combustion contributes the lion's share to the quasi-static pressure of an internal detonation, there are only subtle effects in the mine blast and free field detonation examples. In the tunnel example, however, the primary shockwave is considerably enhanced by the energy released during aerobic combustion.