THE ARA HIGH EXPLOSIVE AFTERBURN MODEL

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ARA has been modeling the afterburn of detonation products for nearly a decade. The models have increased in sophistication and realism with each upgrade. Our current model includes metallic particulate burn, as well as carbon, hydrogen and methane found in detonation products. This paper describes our current afterburn model and the steps that have been used to arrive at this model. A number of comparisons with experimental data are used to validate the model.

As the models become more sophisticated, we learn more about the processes and their interactions. We have found several important parameters for energy release. One of the primary observations is that metal particulates take a finite time to heat. This fact may be influenced by a number of phenomena. If the charge is small, expansion may cool the fireball too rapidly for the metal to reach burn temperature. Charges with cases having a mass greater than ~.8 of the explosive mass lose about half of their detonation energy to case fragment kinetic energy. This energy loss rapidly cools the fireball and may prevent the metal particulates from reaching ignition temperature. These and many more observations will be presented.