NEAR-FIELD AIRBLAST CHARACTERIZATION OF UNCONFINED HOMEMADE EXPLOSIVES (ANFO, AN/AL, AND KCL)

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The threat from Improvised Explosive Devices (IEDs) continues to grow around the world. The threat ranges from shallow-buried IEDs to personnel-borne IEDs and large vehicle-borne IEDs, all utilizing various existing and new homemade explosive (HME) formulations. There is a significant need to expand the current capability to characterize the loads and loading distributions from the detonation of emerging HMEs and non-ideal explosives used in IEDs to improve our understanding of these threats and advance our ability to model these loads in the development of protective systems. The U.S. Army Engineer Research and Development Center is conducting research under the Adaptive Simulation to Characterize Emerging Non-Ideal Threats Program to improve our understanding of the physics, scalability, and spatial loading distributions of various non-ideal explosives. The research is focused on developing and improving constitutive models for non-ideal explosives in shock-physics codes. The goal is to improve the accuracy and flexibility of explosive models used for these current and emerging HME threats to account for significant differences in the burn rate, shock front, and confinement effects when compared to current ideal explosive models. Well-characterized and highly instrumented experiments were conducted using widely proliferated HME explosive mixtures including Anfo, AN/Al, and KCL. The experimental layout, test results, and results from CTH hydrocode calculations compared with the experimental data will be presented.

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