CALCULATIONAL INVESTIGATION OF LINE CHARGE AIR BLAST PHENOMENA

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The U.S. Army Engineer Waterways Experiment Stations (WES) has recentlyconducted experiments with high explosive line charges. In conjunctionwith these experiments, several theoretical computer-code calculationswere made in order to gain a better understanding of the associatedairblast phenomena. Additionally, calculations using variations ofthe charge configuration were made to investigate modification of airblast waveforms during the positive phase.

A one-dimensional hydrodynamic computer code with multiple material capabilities was used for the calculations. The code is extremly flexible in that it can be run in any of three different geometries.
It also includes equations-of-state for the burn of several high-explosive materials.
Two separate classes of calculations were made: first, the detonation of the charge was treated as a planar detonation wave traveling axially down the length of the charge; second, the detonation was treated as a cylindrical detonation wave starting at the charge center and burning outward in the radial direction. The results of the calculations supply temporal and spatial information on airblast phenomena particular to these configurations.

Calculational results were compared directly to experimental data, with excellent agreement. The agreement with experimental data not only proved the capability of the code to model the experiments, but also validated the experimental results which, up to this time, had been seriously questioned.
Further, results from modified-charge calculations showed that an increase in the positive phase duration and overpressure impulse could be obtained by adjusting the charge desgin.

The use of theoretical computer calculations provided a quick, inexpensive, and reliable mechanism to determine the effectiveness of several charge configurations as well as a means of analyzing associated airblast phenomena. These capabilities are usually not available throgh experimental procedures.