SHOCK PROPAGATION IN BAGGED HIGH EXPLOSIVES

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Recent large high explosive (HE) tests have required the use of containers to shape the charge and protect it from weather effects. Stacking bags filled with HE offers a less expensive method of shaping the charge.
Smaller tests such as DICE THROW, MISERS BLUFF, MILL RACE, and DISTANT RUNNER used dome cylinders constructed of 50-lb bags of ANFO. Extension of this concept for larger tests would require the use of plastic bags to provide protection from weather effects. If there is no use of fill to help eliminate air pockets what airblast degradation occurs in such a test?

The influence of the voids on the detonation process and the resulting airblast has been explored through computational modeling. The high explosive ANFO has been used varying the bag size and the degree of void space between the bags. Simulation of the shock propagation has been achieved by modeling the individual bags as cubes which are separated by some fraction of the bag dimension. Because of the need to know the strength and shape of the airblast outside the charge and several charge radii away, the computational grid has been approximately extended to 3 charge radii in the X, Y and Z directions. Because of the large amount of data available from a 3-D calculation, selected directions are examined. Data was collected at stations located inside and outside the charge placement.

The essence of the model which simulates this scenario is a hydrocode coupled to a reactive flow model. The code is capable of predicting the time-dependent flow in three-dimensions with high fidelity. Coupled to this is a reactive flow model that carries the detonation process from bag to bag.
Results of this study provide an assessment of the airblast degradation from a stacked bag approach. basic understanding of shock propagation in HE material with voids is obtained. The examples presented show the basic models are available to assess the airblast modifications.