

A STUDY HEST/DIHEST INTERACTION PHENOMENA USING SMALL CHARGES IN A HALF SPACE APPARATUS

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The proper design of a combined airblast/ground shock simulator is critical in achieving the correct freefield environment at the test structure.

Recent HEST/DIHEST tests have exhibited complex and confusing results, believed due to interactions between the simulator components, resulting in broken cables, lost data, and improper test environments at the test structure. To study these phenomena a half space apparatus was designed, built and prototyped. Measuring 8 feet in diameter by 5 feet deep, it contains a large, specially designed window to allow direct, continuous visual documentation of particle motions during the entire simulation. Three experiments, a HEST, a DIHEST, and a combined HEST/DIHEST, using properly shaped pound-size charges, were used to simulate the field events. Observed first were HEST-generated vertical motions followed by the formation of shear zones developing inward from the HEST boundary which were later perturbed by outward motions from the DIHEST. Resulting cavity and crater shapes were similar to the field events. More important, vector directions of particle motion data replicated the sparse field data reasonably well. Thus, we believe that this half space apparatus can be used to examine the kinematics of complex simulation processes in a wide variety of controlled geologic configurations. This device should be very useful in better understanding and in extrapolating past field event data, including combined-simulation/structure interactions, as well as in improving the design and instrumentation placement on future field events.

Further, when used in conjunction with our companion centrifuge facility, the examination of the kinetics of the simulation process and the attendant scaling issues is feasible.