COMPLETE COMPUTER SIMULATION OF CRATER BLASTING INCLUDING FRAGMENTATION AND ROCK MOTION.

Dale S. Preece
Lee M. Taylor
Sandia National Laboratories
Albuquerque, New Mexico 87185
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<u>ABSTRACT</u>

Computer simulation of the physics involved in conventional rock blasting can be split into two phases; transient stress wave propagation and rock motion. Because the two phases involve totally different mechanisms and time scales, they must be numerically modeled with two different computer programs. The first phase is usually modeled with a finite element or finite difference code which treats the rock as a continuum and simulates the transient stress wave and subsequent fragmentation of the rock. The second phase is usually modeled with a distinct element technique where the rock mass after fragmentation is no longer treated as a continuum but as a finite number of distinct particles that interact with each other through collision mechanics.

In the past, data has been transferred manually from the transient stress wave code to the rock motion code. Manual data transfer has proven to be a long, laborious process that greatly limits the number of simulations that can be made. In order to make blasting simulations routine, the transfer of information has to be tone automatically by the computer. The tasks involved in automatic transfer of information include: 1) conversion of the finite element mesh into a distinct element (spheres) mesh that contains fragmented and unfragmented regions and where the sphere else in the fragmented regions reflects the fragment adze distribution calculated by the transient wave code, 2) correctly interpolate the transient wave induced residual velocity from the finite element mesh to the distinct element mesh.

A new computer program called DMC (Distinct Motion Code) has been developed to calculate roe}motion using a spherical element mesh. The major advantage of DMC over previous codes is computational efficiency.

An example problem is presented where a crater geometry is simulated through the entire blasting process including the transient stress wave phase and the rock motion phase.