# P64 A Numerical Study of the Effect of Early Time Cratering on the Far Field Airblast

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## Abstract:

When a pile of high explosives (HE) explodes over a soil medium, it is customary to assume all the energy from the explosion is used in producing the airblast. This is generally taken as a good assumption until the measured pressure-time histories some distance away from the charge disagree significantly with the hydrocodes predictions. In particular, when hydrocodes over-predict the blast effects, the possibility of losing some fraction of the explosion energy to cratering is often offered as the reason for the difference. This explanation is usually substantiated by a decent size crater centered at GZ. For surface bursts, there is no question that some fraction of the explosion energy went to producing the ground shock and the crater. The question is whether the energy loss to cratering is large enough to produce a discernable difference in the blast time-histories at a distance tens of crater radii away. The present study evaluates the effect of a soft ground on the far field airblast using two hydrocode calculations. The MAZ code will be used for the present study. The explosion configuration is a hemispherical charge set on top of rigid ground in one calculation, and a deformable ground in the other calculation, where the ground surface is modeled as a set of connected and impermeable plates[1] that deform according to the pressure load produced by the charge. By comparing the two calculations, it is found that the energy loss to cratering can be of the order of ten percent of the explosion yield for this configuration. The pressure-time histories in the far field from these calculations show distinct differences. In order to justify these results, a second attempt is made to calculate the same explosion in an air over water configuration. MAZ has the capability to calculate explosions in a multi-phase medium. In this case, a water crater will be formed. The results will be compared to the previous calculations using rigid and movable ground surfaces.

[1]C.K.B. Lee, A Convergence Study of the Hydrodynamic-Plate Method for Coupled CFD/CSD Problems, Poster Session, MABS20, Oslo, 2008.

## Notes: