TOWARDS A PARAMETRIC MODEL OF A PLANAR BLAST WAVE CREATED WITH DETONATING CORD

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A shock wave originating from a point source will expand spherically. At large distances the area of impact from this sphere is considered to be plane. For a test scenario this implicates a major problem: either the donor explosion has to be very large to generate a significant pressure at large distances or the blast wave is still spherical.

To overcome this problem researchers use multiple point sources, or a curtain of detonating cord instead of the single point source. Both these options introduce a different problem: the generated pressures and other blast parameters are hard to predict. These are measured and with iterative trial and error the desired parameters are realized.

This paper describes the first steps towards the generation of a model for predicting the blast wave parameters of a planar wave. The blast wave parameters are determined using Autodyn, for the full range of the scaled distance Z.

First, the results of the spherical (1D) calculations are compared to several models described in literature. The generally accepted Kingery-Bulmash relations, implemented in CONWEP, are used as reference. An overall good similarity is found, as well as some specific deviations. Next, Autodyn is used to determine the blast wave parameters generated with a wire explosion (2D) using detonating cord. These calculations are compared to the results of experiments, with special attention to the point of initiation. Based on these results, a parametric model of a wire explosion is formulated.

The ultimate aim of the modeling will be the expansion of both the point and line models to a model of a plane detonation, being a set of in-plane wires, generating a plane blast wave.