EFFICIENT ANALYSIS OF HIGH EXPLOSIVE AIR BLAST IN COMPLEX URBAN GEOMETRIES USING THE AUTODYN-2D & 3D 1-IYDROCODES AND ANALYTICAL METHODS

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This paper describes numerical and analytical methods for assessing the interaction of high explosive air blast within the complex geometries typical of a congested urban environment. The behavior of blast waves in this type of geometry is both difficult to predict and of great importance in assessing explosion effects on buildings and people.

Several example numerical calculations are presented. These analyses used an efficient combination of 1,2 and 3-dimensional analysis steps with remapping of the blast wave between each stage to minimize the required processor power and calculation time. The calculations used a second order Godunov solver in the 1 and 2 dimensional steps and an FCT based solver for efficient analysis of 3-dimensional blast wave propagation.

It is shown that for some simplified geometries, 2-dimensional analysis can provide sufficient accuracy. For more complex geometries, a full 3-dimensional analysis is required to accurately predict the complex reflections and interactions associated with the propagation of the blast wave. Comparison of the numerical results with predictions made using conventional analytical methods such as the Kingery and Bulmash polynomials contained in the widely used Conwep program show a dangerous under prediction of the blast wave parameters when the confining effects of city centre streets are neglected.