INFLUENCE OF URBAN GEOMETRY ON BLAST WAVE RESULTANTS

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Terrorist attacks on civilian targets have, in recent years, involved the use of increased weights of explosive material. This move to increased charge size has significantly increased the number of buildings in an urban environment affected by the blast, and the pattern of the damage inflicted on structures has become less easy to predict. For example, for a building relatively close to an explosion where all glazing elements might be expected to be destroyed a substantial number are sometimes found to survive, while at a range where even weak glazing elements would be expected to remain intact, damage has sometimes been extensive. The primary aim of the work reported here is to enhance the understanding of how blast waves from a large explosion interact with buildings in an urban environment and to quantify features of the environment that influence the magnitude of blast wave resultants and hence the potential level of damage.

The first stage of this study has involved the construction of plane-fronted target structures, experiments to measure the pressure-time histories on these plane facades and comparison of these records with the results of simulations using the RMCS blast simulation code Air3d. The second stage of the study has involved using the same numerical modelling technique to examine systematically the effect of street width on blast wave resultants (primarily impulse), to obtain a basic understanding of the processes, and to quantify, in broad terms, the essential elements of the problem.