MICROBLAST - A BENCHMARKING STUDY OF GRAMME-SCALE EXPLOSIVE TRIALS

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Abstract:

Explosions are a pressing and pervading threat in the modern world. The extensive damage caused by recent large scale urban explosions such as Tianjin (2015) and Beirut (2020) has highlighted a key gap in our knowledge. That is, we still do not yet understand, nor can we reliably and rapidly predict, blast loading in complex cityscape environments. Accordingly, determination of consequences related to risk, structural damage, and casualty numbers, is severely limited. Current experimental approaches do not have the sophistication nor fidelity required to accurately measure blast loading in urban environments, and there is a significant and growing disparity in the complexity with which numerical models and experimental work can operate. Because of this, key insights gained from detailed modelling studies have not been validated, and we do not yet fully understand how blast waves propagate and interact with multiple obstacles. This paper presents the development of a series of experimental studies aimed at addressing this shortfall. The ultimate objective of this work is to develop the *MicroBlast* facility: an ultra small-scale testing apparatus for rapid, high-rate, high-resolution, multi-parameter measurements of blast loading in complex environments. Here, we present results from preliminary trials aimed at establishing the reliability and repeatability of small-scale explosive testing, in increasingly complex layouts. The results are directly compared to commensurate larger-scale test data and suggestions for future modifications are made.