IMPLICATIONS OF BLAST-RESISTANT RETROFITS ON THE BLAST RESPONSE OF MASONRY WALLS

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Masonry exterior wall construction is a common cladding system for conventional buildings due to its economy and simplicity of construction. In general, unreinforced masonry walls can generate hazardous debris when subjected to blast loads. For severe blast loads, even conventionally reinforced masonry walls provide limited protection to building occupants. In blast-resistant design, existing masonry walls often require some type of retrofit in order to conform to blast-resistant design requirements. There are different types of blast retrofit systems available for masonry walls. In general, the most common types of retrofits consist of externally applied bonded (e.g. reinforced and unreinforced polymers) and unbonded (e.g. geotextiles, steel sheets, etc.) materials.

Simplified SDOF-based methodologies, validated by experimental data, are available for the blast analysis and design of these retrofits on masonry walls. This paper discusses the flexural and tension membrane resistance mechanisms of bonded and unbonded retrofits on masonry walls based on experimental and analytical observations. The paper discusses the effects of different retrofit properties such as adhesion, debonding, and connection detailing, on the resistance-deflection relationship and ductility capacity of masonry walls. Furthermore, the paper discusses the combination of resistance mechanisms, such as rigid arching (compression membrane) of unreinforced masonry walls and flexural resistance of reinforced masonry walls, with the bonded and unbonded retrofit systems. The effectiveness and efficiency of these retrofits, when rigid arching and/or flexural reinforcement are present, are examined.