EXPLOSION IN A MULTI-CHAMBER: EXPERIMENTAL INVESTIGATION

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Security is nowadays a real and major concern, especially when explosives are involved. These explosives threats can be of accidental nature or due to the use of an improvised explosive device. To address this security issue, an accurate prediction of the behavior of shock waves caused by a detonation propagating inside or outside a building and interacting with the surrounding environment is required.

Extensive knowledge regarding shock waves in free field can be found in the literature so that their behavior is now well known. Analytical, empirical or numerical tools have been developed to predict the pressure flow generated by the detonation of an explosive in free field. However, there is very few information available in the open literature for confined configuration and the tools developed in free field do not apply in this case or are limited.

This study focuses on the behavior of a shock wave within a confined multi-chamber system and on the impact of different parameters such as the size of the rooms and the width of the corridor on the pressure history inside the building.

Several small-scale experiments are carried out using an adjustable model of a four-roomed single-story building. The rooms are connected to a single corridor. This model is representative of a pyrotechnic workshop. The detonation is generated by a hemispherical charge of a propane-oxygen stoichiometric mixture and pressure histories are recorded with pressure transducers distributed on the ground in the four rooms and in the corridor.

These experiments will provide data regarding the propagation and the interaction of shock waves within a confined environment.