SMALL-SCALE DETONATIONS IN A GENERIC SINGLE-STORY SYSTEM

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In a current research project we investigate the properties of blast waves caused by indoor explosions and their propagation inside typical building structures. The experiments are performed at laboratory scale by means of spherical miniature Nitropenta-charges manufactured by the EMI. They are detonated in one chamber of a generic room structure that models a single-story system. lt consists of 2 rows of 3 rectangular chambers each that branch sideways from a corridor leading into a larger room at its end. The overall size of the model is 350 x 600 x 40 mm 3 . Floor and ceiling are realized by transparent Makrolon panes. These facilitate flow visualization by means of a single-spark shadow-photography setup with a field of view 600 mm in diameter. To complete the diagnostics ten piezo-electric pressure gauges are installed into the outer walls of the model which supply quantitative data about the load onto the walls.

Among others one aspect of the indoor detonations we have scrutinized is the variation of the charge density in the detonation chamber. The charge weight ranged from about 0.05 g to about 0.5 g. Included into the test series were a number of experiments where the charge contained an admixture of aluminum powder. Though the evaluation is not yet completed the first results show an increase in the late time loading of the walls. The additional charge mass does not completely justify this increase. Thus the aluminum containing charges might be a model for unbalanced high explosives and the increase in the loading is possibly caused by afterburning of the aluminum particles which releases additional energy into the system.

Another aspect is the influence of a venting hole in the chamber where the detonation occurs. We have performed experiments with holes diameter between 0.8 and 2.5 charge diameters. The venting hole has nearly no influence on the primary blast wave. It gains influence only at later times then causing a significant decrease of the average pressure acting on the walls.