BLAST WAVE REFLECTION: SMALL-SCALE EXPERIMENTS

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ABSTRACT

In the study of the response of a structure to a blast wave, a key point is an accurate description of the blast loading. The blast wave is reflected on flat structures with amplified overpressures and the reflection factors depend of the incidence angle between the shock propagation direction and the surface. A significant increase of the reflected overpressure is theoretically predicted at the angle of transition from regular to Mach reflection. In this situation, the reflected overpressure is higher than for the perpendicular reflection. However, this effect is still not taken into account in some technical guidance [1] due to the difficulty to observe this enhancement effect in dedicated experiments [2].

In this study, small scale experiments were performed by detonating different hemispherical charge of propane-oxygen stoichiometric mixtures on a modular blast-table. Up to 17 rigid targets, instrumented with pressured gauge sensors, were fixed on the blast table at the same distance from the source but with variable angle of incidence. This configuration enabled to draw, for a single test, the complete reflection factors versus angle of incidence curves for both overpressure and impulse. The enhancement in reflection factors, in the transition region from regular to Mach reflection, is clearly observed. These new experimental data are being used to validate CFD numerical simulations.