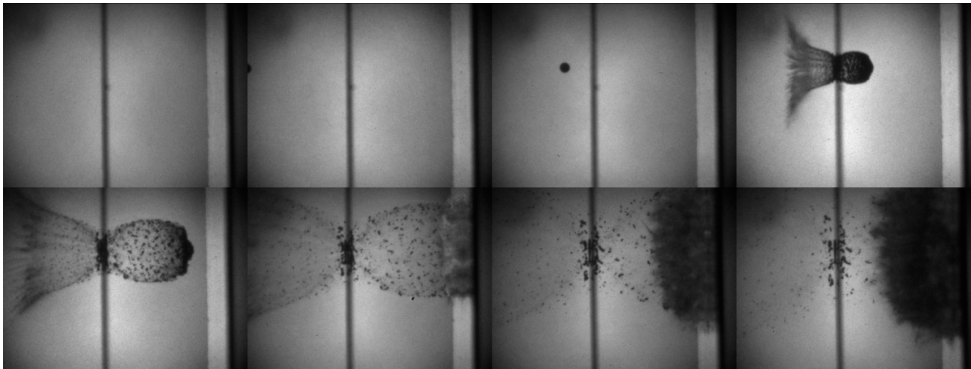


No. 5

Investigating Hypervelocity Impact Phenomena using the SIM8 high speed camera.



IMAGING PARAMETERS

The SIM8 Framing camera with a 105mm lens giving a horizontal field of view of 63mm; (about $4.9\mu\text{m}/\text{pixel}$). Externally triggered from a make screen located 896mm from the impact point.

EQUIPMENT PARAMETERS

The SIM8 was programmed to take an 8 image sequence with initial delay of $209\mu\text{s}$. The camera was programmed for 200,000 fps, with exposures of 20ns. Gain was set at 3 out of 10 steps on all frames. The event was back illuminated using a SI-AD500 flash lamp. The SI-AD500's 2ms flash duration provides adequate illumination for the complete event.

OVERVIEW OF EXPERIMENT

The target was a 1mm thick aluminum plate and a 2mm thick aluminum witness plate positioned at 30mm each other. The 3mm projectile, which is padded with plastic sabots, was fired from a fixed 2 stage light gas gun operating at Thiot Ingenierie Shock Physics Laboratory. A make screen trigger was positioned 896mm up range of the target to allow the sabots to generate the trigger (the small size of the projectile prevents reliable triggering directly from the projectile itself).

The target was impacted by the 3mm projectile at a velocity of 4060 m/sec. The high resolution images clearly show the cloud of ejecta thrown backwards on impact and also demonstrates that even though the projectile disintegrates on impact, the fragments maintain the original projectile shape ahead of the main fragment cloud. This test shows that the remaining fragments do not have enough energy to penetrate the second aluminum witness plate when two thin layers are used instead of one thicker layer.

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