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The Effect of Detonation Wave Incidence Angle on the Acceleration of Flyers by Explosives Heavily Laden with Inert Additives JASON LOISEAU, WILLIAM GEORGES, DAVID FROST, ANDREW HIGGINS, McGill University — The incidence angle of a detonation wave is often assumed to weakly influence the terminal velocity of an explosively driven flyer. For explosives heavily loaded with dense additives, this may not be true due to differences in momentum and energy transfer between detonation products, additive particles, and the flyer. For tangential incidence the particles are first accelerated against the flyer via an expansion fan, whereas they are first accelerated by the detonation wave in the normal case. In the current study we evaluate the effect of normal versus tangential incidence on the acceleration of flyers by nitromethane heavily loaded with a variety of additives. Normal detonation was initiated via an explosively driven slapper. Flyer acceleration was measured with heterodyne laser interferometry (PDV). The influence of wave angle is evaluated by comparing the terminal velocity in the two cases (i.e., normal and grazing) for the heavily loaded mixtures. The decrement in flyer velocity correlated primarily with additive volume fraction and had a weak dependence on additive density or particle size. The Gurney energy of the heterogeneous explosive was observed to increase with flyer mass, presumably due to the timescale over which impinging particles could transfer momentum.

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