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An Explosively-Driven Multi-Flyer System for Investigating Fragment Impact Initiation of PBXs[1] JOHN YEAGER, PATRICK BOWDEN, ANDREW SCHMALZER, JOSEPH LICHTHARDT, Los Alamos National Laboratory — Recent experimental testing found that plastic-bonded explosives (PBX) can be initiated by metal-cupped detonators in a non-contact "standoff" configuration. Depending on the detonator type, and high explosive (HE) driver (e.g. PETN, HMX, or PBX 9407), a stochastic field of sub-mm fragments is generated which travel initially >3 km/s. Determining the initiation mechanism in this scenario for the target PBX materials is difficult; the interplay between fragment size/shape, incident angle and velocity creates a highly complex variable set. Since each detonator cup breaks apart stochastically, each test potentially probes different initiation mechanisms; e.g. single large fragment versus multiple smaller fragments generating shock coalescence leading to detonation. To attempt to simplify this problem, and enable new hydrocode simulations, experiments were undertaken to design and parameterize a flyer system capable of launching multiple small flyers of a standardized size and shape simultaneously. Additionally, with the large stochastic dataset in hand, elucidating a James-type criterion for initiation was gained for various PBXs. 3D Simulations using reactive burn models in the CTH hydrocode were also performed to guide the experimental design and help analyze ignition criteria. LA-UR-19-21652

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