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Low-Order Modeling for the Impact Energetics of Laser-Driven Micro-Flyers with Thin Stationary Targets MARK FRY, KEITH GONTHIER — The impact of high-speed (500-1500 m/s), laser driven micro-flyers (thickness $\sim$ 5 μm) with thin energetic targets (thickness $\sim$ 10 μs) is being examined to characterize deformation induced heating and combustion of these materials. To guide development of experiments, a low-order (zero-dimensional) model is formulated that can accurately and efficiently estimate ballistics maps for a large dimensional parameter space. The model accounts for the energetics of early time wave interactions and longer time shearing of the target during penetration and perforation. The model is validated against data for the impact of larger flyer and target configurations, and is used to predict ballistic maps for micro-scale configurations. Preliminary predictions for the impact of aluminum micro-flyers with thin steel targets indicate that the ballistic behavior is sensitive to micro-flyer mass and geometry. Model limitations are highlighted, and improvements are suggested.

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