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An experimental study of an explosively driven flat plate launcher

PHILIP RAE, ERIK HAROZ, CHRIS ARMSTRONG, LEE PERRY, Los Alamos National Laboratory, M DIVISION TEAM — For some upcoming experiments it is desired to impact a large explosive assembly with one or more moderate diameter flat metal plates traveling at high velocity (2–3 km s⁻¹). The time of arrival of these plates will need to be carefully controlled and delayed (i.e. the time(s) of arrival known to approximately a microsecond). For this reason, producing a flyer plate from more traditional gun assemblies is not possible. Previous researchers have demonstrated the ability to throw reasonably flat metal flyers from the so-called Forest flyer geometry. The defining characteristics of this design are a carefully controlled reduction in explosive area from a larger explosive plane-wave-lens and booster pad to a smaller flyer plate to improve the planarity of the drive available and an air gap between the explosive booster and the plate to reduce the peak tensile stresses generated in the plate to suppress spalling. This experimental series comprised a number of different design variants and plate and explosive drive materials. The aim was to calibrate a predictive computational modeling capability on this kind of system in preparation for later more radical design ideas best tested in a computer before undertaking the expensive business of construction.

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