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Hydrodynamics simulations of a low-cost, high-throughput, and compact high-explosive ejecta source platform[1] LEO KIRSCH, FADY NAJJAR, JOSE SINIBALDI, Lawrence Livermore Natl Lab — Ejecta are the particles that are ejected from a material's surface following the release of an extreme shock compression state. These high velocity ballistic particulates play a role in a wide range of phenomena from additive manufacturing, inertial confinement fusion, and supernovae explosions. Production and collision of micron-sized ejecta at velocities of ˜1 km/s are difficult phenomena to study experimentally due to the small time and length scales involved. Other large-scale ejecta source experiments have high costs due to the vast amount of high explosive required. This expensive and destructive testing requires long reset times and ultimately yields few precision measurements. The work presented develops a low cost, high-throughput ejecta source platform. The proposed design utilizes small high explosive charges (<1g) which allows future experiments to be conducted at the Dynamic Compression Sector at Argonne National Laboratory where high-resolution X-ray imaging can be used to elucidate the ejecta formation process. We perform detailed continuum hydrodynamics simulations to highlight the feasibility of such a platform. We investigate the sensitivity to generate melt-on-release ejecta with platform geometry, mesh refinement, and materials' equations of state.

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