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Probing Dynamics of 2-D Granular Media via X-Ray Imaging RYAN CRUM, MINTA AKIN, ERIC HERBOLD, JON LIND, MIKE HOMEL, RYAN HURLEY, Lawrence Livermore Natl Lab — Granular systems are ever present in our everyday world and influence many dynamic scientific problems including mine blasting, projectile penetration, astrophysical collisions, and dynamic compaction. Despite its significance, a fundamental understanding of granular media's behavior falls well short of its solid counterpart, limiting predictive capabilities. The kinematics of granular media is complex in part to the intricate interplay between numerous degrees of freedom not present in its solid equivalent. Previous dynamic studies in granular media primarily use VISAR or PDV, macro-scale diagnostics that only focus on the aggregate effect of the many degrees of freedom leaving the principal interactions of these multiple degrees of freedom too entangled to elucidate. To isolate the significance of individualized grain-to-grain interactions, this study uses in-situ X-ray imaging to probe a 2-D array of granular media subjected to high strain rate gas gun loading. Analyses include evaluating displacement fields and grain fracture as a function of both saturation and impactor velocity. X-ray imaging analyses feed directly into our concurrent granular media modeling efforts to enhance our predictive capabilities. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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