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Damage progression in explosively loaded polycrystals T.A. MASON, B.L. HENRIE, K.A. THOMAS, MST-8 TEAM, DX-1 TEAM — One of the current challenges facing researchers in the field of dynamic properties of materials is the need for a predictive modeling capability for damage and fragmentation. A series of small-scale, explosively-driven experiments were designed and executed in order to gain a better understanding of the nucleation and growth of damage under explosive loading. The interaction of varying obliquity detonation waves with the test articles was of particular interest. The material in these tests experiences a combination of hydrostatic and deviatoric stresses that is spatially and temporally varying. Variations in shot geometries and explosive load causes direct variations in the nature of the resulting damage fields in the recovered samples. The characterization of a number of samples from a test series of tantalum discs will be presented and compared to numerical analyses of the experiments. Insights gained from the post-mortem examination of the discs and the accompanying simulations will be presented. In addition, future expansions of these experiments that will give more guidance to modeling efforts will also be briefly discussed.

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