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Dynamic Strength Analysis of Tantalum using a Multimode Rippled Target under Laser Driven Quasi-Isentropic Compression[1] PING QIAN, ROBERT CAVALLO, HYE-SOOK PARK, CHRIS PLECHATY, SHON PRISBREY, MIKE WILSON, BRIAN MADDOX, KERRI BLOBAUM, ROBERT MAY, Lawrence Livermore National Laboratory — We present results from a material strength analysis of tantalum using a multimode rippled target under quasi-isentropic plasma loading at pressure greater than 100GPa and strain rate above 106 s-1. The results are compared with test data measured at Omega Laser. A conventional approach [1,2] utilizes the RTI (Rayleigh-Taylor Instability) mechanism to infer material strength from the growth of a single sinusoidal mode pre-imposed on a target. This method was proven reliable [2,3], but there is room for improvement in efficiency. By deploying an initial perturbation with two or more sinusoidal modes superimposed onto a single target, we are able to collect more test data in a single experiment. Presented in this paper are the verification of a multimode approach against single mode; mode coupling development during the loading sequence; the behavior of induced modes; and the detection of those modes in both simulation and test measurements.

[1] B.A. Remington et at., Material Science and Technology, Vol. 22, No. 4, 2006
[2] H.S. Park et al., PRL. 104, 135504 (2010)
[3] N. R. Barton et al., J. of Applied Physics, 109, 073501, 2011

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