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Elastic precursor shock waves in tantalum at very high strain rates JONATHAN CROWHURST, MICHAEL ARMSTRONG, HARRY RADOUSKY, JOSEPH ZAUG, SEAN GATES, Lawrence Livermore National Laboratory — We have obtained data from micron-thick tantalum films using our ultrafast laser shock platform. By measuring free surface velocity time histories at breakout, and shock wave arrival times at different film thicknesses, we have been able to estimate the dependence of particle and shock velocities on propagation distances and strain rates. We will show how elastic precursor shock waves depend on strain rate in the regime up to and above 10^9 s^{-1}. We find that while elastic amplitudes are very large at very early times decay occurs rapidly as propagation distance increases. Finally we will consider the prospects for using these data to obtain the dynamic strength of tantalum at these very high strain rates. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract No. DE-AC52-07NA27344 with Laboratory directed Research and Development funding (12ERD042).

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