

Abstract Submitted
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Material strength measured by flyer-impact perturbation method¹ XIAOJUAN MA, Southwest jiaotong university/Caltech, PAUL ASIMOW, OLEG FATYANOV, Caltech, FUSHENG LIU, Southwest jiaotong university — Yield strength is one of the most important physical properties of a solid material, especially far from its melting line. The flyer-impact perturbation method measures material yield strength on the basis of correlation between the yield strength under shock compression and the damping of oscillatory perturbations in the shape of a shock front passing through the material. We used flyer-plate impacts experiments on targets with machined grooves on the impact surface to shock aluminum to between 32 and 71 GPa and recorded the evolution of the shock front perturbation amplitude in the sample with electric pins and fibers. Simulations using the elastic-plastic model can be matched to the experiments, explaining well the form of the perturbation decay and constraining the yield strength of aluminum to be 1.3-3.1 GPa. These results are in agreement with values obtained from reshock and release wave profiles as well as the result deduced from the SCG model. We conclude that the flyer-impact perturbation method is indeed a reliable means to measure material strength.

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