

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

A method using the surface perturbation to determine the strength of materials JIANWEI YIN, HAO PAN, ZIHUI WU, XIAOMIAN HU, Institute of Applied Physics and Computational Mathematics, Beijing — The determination of the dynamic strength of materials at high pressure and strain rate has been focused by the shock dynamics community for many years. This paper simulated the surface perturbation problems under high pressure and strain rate loading. By adjusting the characteristic geometric variables as wave number, amplitude of initial perturbation at the free surface, we studied the growth of the perturbations in the improved forms of the theoretical results given by Piriz et al. (Phys. Rev. E 78, 056401, 2008). The critical condition that the surface perturbation was restrained from unstable grow was also deduced. In the stable region of perturbation growth, the relationship among the relative velocities, displacements of the key positions at the perturbed surface and the material strength was studied. The experimental feasibility of using the improved relationship to determine the strength of materials was also discussed.

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Date submitted: 05 Nov 2015

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