

Abstract Submitted
for the SHOCK07 Meeting of
The American Physical Society

Two critical damage parameters for the dynamic tensile fracture of ductile metals HONGLIANG HE, Laboratory for Shock Wave and Detonation Physics Research, Institute of Fluid Physics, P.O.Box 919-102, Mianyang 621900, P. R. China, YONGGANG WANG, Mechanics and Materials Science Research Center, Ningbo University, Ningbo 315211, P. R. China, MEILAN QI, College of Science, Wuhan University of Technology, Wuhan 430070, P. R. China, FUQIAN JING, Laboratory for Shock Wave and Detonation Physics Research, Institute of Fluid Physics, P.O.Box 919-102, Mianyang 621900, P. R. China — A concept of critical fracture in the dynamic tensile spall has been developed via percolation model and two physical parameters, named as the critical linking damage D_l and the critical fracturing damage D_f , are proposed. D_l indicates the critical value of damage for the onset of void coalescence, and D_f the critical value for the occurrence of catastrophic fracture. With experimental measurements of the free-surface velocity profiles and the numerical simulations, we demonstrate that these two critical damage parameters are independent on the impact stress and the tensile strain rate, and it is also applicable to predicting the dynamic tensile fracture behavior in metal cylinders. Therefore, we may regard these parameters as the material constants to identify the intrinsic characteristic of the dynamic tensile fracture in explosion and shock wave events.

Hongliang He
Laboratory for Shock Wave and Detonation Physics Research,
Institute of Fluid Physics, P.O.Box 919-102,
Mianyang 621900, P. R. China

Date submitted: 16 Apr 2007

Electronic form version 1.4