Abstract Submitted
for the SHOCK05 Meeting of
The American Physical Society

Failure Fronts in Brittle Materials and Their Morphological Instabilities MICHAEL GRINFELD, SCOTT SCHOENFELD, TIM W. WRIGHT, US Army Research Laboratory — There are various observations and experiments showing that in addition to standard shock-wave fronts, which propagate with transsonic velocities, other much slower wave-fronts can propagate within glass or ceramic substances undergoing intensive damage. These moving fronts propagate into intact substance leaving intensively damaged substance behind them. They have been called failure waves. In this paper we model them as sharp interfaces separating two states: the intact and comminuted states. The approach is based on an analogy between failure fronts and fronts of slow combustion. In this presentation we announce two main theoretical results that require experimental verification. One of them concerns the speed of a failure wave driven by oblique impact of a brittle target. The other establishes a criterion for morphological instability of failure fronts.

Dattatraya Dandekar
US Army Research Laboratory

Date submitted: 04 Apr 2005 Electronic form version 1.4