

Abstract Submitted  
for the SHOCK07 Meeting of  
The American Physical Society

**Determination of simple constitutive models for DEDF glass using penetration-velocity data from ballistic experiments** GORDON JOHNSON, TIMOTHY HOLMQUIST, Network Computing Services Inc. — Constitutive models for brittle materials such as glass can be very complex as they are dependent on strains, strain rates, pressures, temperatures, damage and other parameters. There may also be significant (pressure-dependent) strength after failure such that the constitutive response is much different for intact material and failed material. A great number of laboratory tests are required to develop a comprehensive constitutive model. Another approach is to develop simple models using penetration-velocity data obtained from ballistic experiments. Here, various functional forms of simple models (with a limited number of constants) are used to (computationally) match the penetration velocity over a range of impact velocities. This allows for the determination of the most important parameters and it provides an approximation of the stresses that occur during penetration. This paper presents constitutive models for high-density DEDF glass. They are based on penetration-velocity data reported by Behner et al. (Proceedings of the 22<sup>nd</sup> International Symposium on Ballistics, Vancouver BC, Canada, November 2005) for gold rods impacting DEDF glass at impact velocities from 400 to 2500 m/s.

Gordon Johnson  
Network Computing Services Inc.

Date submitted: 23 Feb 2007

Electronic form version 1.4