# Quantitative relationships between stress distributions, microstructure and high strain rate performance of advanced ceramics: an interim report

November 1, 2006

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ABSTRACT:

Ceramics often replace metal parts while providing improvements to a system. However, the exact relationship between characteristics of ceramic materials and mechanisms of failure is still being explored by the research community. This paper showcases current progress of an ongoing project concerning advanced ceramics under high strain rate and large strain conditions. The project places special emphasis on the effects of microstructure and the implications of highly variable internal stresses prior to cracking.

Numerical simulations created in `OOF2`, a program developed at NIST which uses object oriented finite elements to analyze real micrographs of microstructures, allow virtual experiments in two-dimensions. Some effects of single crystal anisotropy on the stress between grains will be presented. Other simulations found in the literature highlight the fluctuation of internal stress states as material is stressed close to failure. Use of the mathematical concept of fractal dimension to characterize these stress states will be discussed.

KEYWORDS: advanced ceramics, microstructure, stress distribution

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