

Abstract Submitted
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Fractal behavior in the fragmentation of brittle reactive materials JOE HOOPER, Naval Surface Warfare Center, Indian Head — A theoretical formulation for the fragmentation of brittle, granular metal composites is presented. This work is based on our experimentally measured fragment patterns of reactive materials under explosive or high-velocity impact loading. At high strain rates, the fragment distribution displays fractal power-law behavior over at least two orders of magnitude in fragment size. This behavior may arise from side-branching off unsteady high-speed cracks, consistent with other recent work on brittle materials. The observed behavior differs markedly from distributions (such as the formulations by Mott and Grady) based on a Poisson-statistics process of crack nucleation and overlap. We present a theoretical fragment distribution to describe this new behavior; there is initial evidence that the power-law may be similar for several pressed granular reactive materials, in which case the theory requires only a single material parameter.

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