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Detonation Properties Measurements for Inorganic Explosives

BRENT A. MORGAN, Microelectronics Technology Dept., The Aerospace Corporation, ANGEL LOPEZ, SELMA GOLDSTEIN, DANIEL GUNTER, Environmental Test and Ordnance Dept., The Aerospace Corporation — Many commonly available explosive materials have never been quantitatively or theoretically characterized in a manner suitable for use in analytical models. This includes inorganic explosive materials used in spacecraft ordnance, such as zirconium potassium perchlorate (ZPP). Lack of empirical information about these materials impedes the development of computational techniques. We have applied high fidelity measurement techniques to experimentally determine the pressure and velocity characteristics of ZPP, a previously uncharacterized explosive material. Advances in measurement technology now permit the use of very small quantities of material, thus yielding a significant reduction in the cost of conducting these experiments. An empirical determination of the explosive behavior of ZPP derived a Hugoniot for ZPP with an approximate particle velocity (u_o) of 1.0 km/s. This result compares favorably with the numerical calculations from the CHEETAH thermochemical code, which predicts u_o of approximately 1.2 km/s under ideal conditions.

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