Abstract Submitted
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Density Measurements of High Explosives Determined using Non-destructive X-ray Computed Tomography.[1] MICHELLE ESPY, NICHOLAS STULL, LARRY HILL, CORT GAUTIER, JAMES HUNTER, SHELDON LARSON, BARTON OLINGER, DARLA THOMPSON, Los Alamos National Laboratory, ALEJANDRO FIGUEROA, Los Alamos National Laboratory; Purdue University — Voids in high explosives (HE) are the most effective way of producing areas of shock-induced energy localization that trigger detonation. Void fraction changes by a large percentage with small changes in density (as small as 0.1%,) producing a substantial effect on detonation sensitivity. Greater variability than this has been observed within die-pressed charges. However, measuring such small variations requires cutting the charge into 1-cm cubes, and measuring the density of each cube by immersion. The method has the disadvantage of being destructive, and requires poor spatial resolution to achieve good density resolution (and vice versa). X-ray computed tomography (CT) could be a non-destructive method to evaluate density variation, with better spatial resolution. However, quantitative measurement of such small variations is challenging for CT due to beam attenuation and scattering. In this work we show that including materials of known density in x-ray CT allows us to quantitatively measure small changes in density between pressed HE parts. We show the use of an algorithm to correct artifacts that can obscure radial density gradients. Inhomogeneous regions of relatively higher density material were also observed. Dual energy CT methods to further improve the sensitivity and identify these inclusions are presented.

[1]U.S. Department of Energy

Michelle Espy
Los Alamos National Laboratory

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