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Nanosecond imaging techniques to characterize detonator breakout performance MICHAEL MURPHY, CHRISTOPHER TILGER, LARRY HILL, Los Alamos National Laboratory — Simultaneous ultra-high-speed framing and electronic steak photography have been applied to the working surface of cylindrical detonators in order to quantitatively assess shock-wave breakout kinematics. The framing camera successfully captured the evolution of two-dimensional cross-sections of the axial shock wave exiting an aluminum output cup of the detonator, and the streak camera collected one-dimensional, space-time breakout curvature with sub-nanosecond resolution. Both data sets have been analyzed to assess the geometrical characteristics of the leading shock wave exiting the cup. An existing and simple model equation for hyperbolic breakout of cylindrical high-explosive (HE) charges has been parameterized for nominal detonator-explosive performance and used to initially inform the geometry of the detonation wave within the functioning detonator. A more detailed investigation will be discussed that assesses what impact the inert aluminum cup has on the model assumptions and parameterization, as well as on ones ability to extract HE-performance parameters when applying the model to detonator-breakout data.

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