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Comparison of Breakout Modes in Analytic Penetration Modeling JAMES WALKER, RORY BIGGER, SIDNEY CHOCRON, Southwest Research Institute — When a projectile approaches the back surface of a target, complicated mechanics and different failure modes can ensue that lead to perforation. There have been a number of attempts to model these different failure modes, for example models due to Ravid and Bodner (1983) and Walker (1999). Of particular interest are analytic models (as opposed to hydrocode models) where the model attempts to explicitly identify relevant failure modes and back surface breakout modes. This paper examines back surface breakout and target failure models with different failure modes to see how they are invoked in specific impact geometries and scenarios. Comparisons are made of thresholds and sensitivities for the different failure modes to gain a greater understanding of their usefulness and applicability. The model results are compared to data to ensure reasonableness of the computations. For example, good agreement is shown with a relatively simple back-surface-strain target failure mode for predicting ballistic limit velocity for large aspect-ratio projectiles and relatively thick targets as compared to the projectile diameter.

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