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Improved Sensitivity Testing of Explosives Using Transformed Up-Down Methods GEOFFREY BROWN, Los Alamos National Laboratory — Sensitivity tests provide data that help establish guidelines for the safe handling of explosives. Any sensitivity test is based on assumptions to simplify the method or reduce the number of individual sample evaluations. Two common assumptions that are not typically checked after testing are 1) explosive response is linear in the applied stimulus levels and 2) the chosen test level spacing is close to the standard deviation of the explosive response function (for Bruceton Up-Down testing). In this work we present efforts to improve sensitivity testing by addressing these assumptions using Transformed Up-Down (TUD) test methods augmented with simple algorithms. TUD methods have been developed extensively for psychometric testing applications over the past 50 years and generally use multiple tests at a given level to determine whether to increase or decrease the applied stimulus. In the context of our work, we can use TUD methods that concentrate testing around useful probability levels and augment them with algorithms for adjusting test level spacing during the evaluation. Transformed methods that we have developed to address the assumptions noted above will be examined and evaluated with simulation to highlight their properties and assess their usefulness.

Geoffrey Brown
Los Alamos National Laboratory

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