

Statistically Valid Estimation of Limit Velocity in Ballistics Testing with Small Sample Size.

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ABSTRACT:

Prediction of limit velocity (v_L) is of special importance in ballistics testing and has been the focus of research for many years. Unfortunately, penetration processes are highly complex and an effective first principles derivation of v_L has not been discovered. Estimation of v_L is therefore done empirically. Furthermore, ballistics tests can be very expensive, resulting in a small size sample with which to perform statistical data analysis.

There are two common methods of conducting ballistics testing. One involves measuring the residual velocity of the projectile after perforation. The other method simply evaluates the perforation without residual velocity. The second method is significantly less expensive.

Simulation is used to model both of the common methods of ballistics testing with different sample sizes. The results are evaluated and compared for statistical significance, accuracy, and relative cost. This work is ongoing and a conclusion has not yet been reached.

KEY WORDS: limit velocity, striking velocity, residual velocity, long-rod penetrators, ballistic testing, least squares, regression, small sample size

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