Abstract Submitted
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Sand Penetration Experiments[1] STEPHAN BLESS, DON BERRY, WILLIAM LAWHORN, The University of Texas at Austin, Institute for Advanced Technology — In an experimental program, steel bullets and short cylinders, and tungsten alloy rods were shot into dry silica sand at 600 to 1100 m/s. The rods included finsets that were designed for aerodynamic stabilization. The fins also apparently provided trajectory stabilization within the sand as well. Time-of-arrival screens allowed measurement of velocity. Analysis of those data indicated that drag coefficients increased as projectiles slowed down. Comparison with previous data indicates there was a slight increase in drag coefficient of rods over expected values for unfinned rods; however, the net result was penetration normalized by length was as high as 40, depending on nose shape. It was found that when the velocity exceeded about 80 m/s (which is close to the speed of sound in sand) sand particles were broken down into their constituent grains, resulting in a decrease in size by about 1000. Normalized penetration is expected to scale as kinetic energy per unit area, and it was significantly higher for the rods than for the other projectiles. This is attributed to stabilization from interaction of the fins with the cavity wall.

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