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Experimental investigation on ballistic stability of high-speed projectile in sand[1] WEI ZHANG, YAFEI QI, WEI HUANG, DACHENG LI, Harbin Institute of Technology, HYPERVELOCITY IMPACT RESEARCH CENTER TEAM — The investigation on ballistic stability of high-speed projectile in granular materials is important to the study of the earth penetrating weapon(EPW). Laboratory-scaled sand entry experiments for the trajectory in the sand have been performed with four different nosed projectiles at a range of velocities from 20 m/s to 250 m/s. The slender projectiles were designed into flat, ogival, hemi-sperical, truncated-ogival nose shapes to make comparisons on the trajectory when those projectiles were launched at vertical and oblique impact angles($0^\circ \sim 25^\circ$) along a view window. A high-speed camera placed at the side of the window was employed to capture the entire process of projectiles' penetration. Basing on the comparison of different tests, theoretical analysis is carried out on the relationships between ballistic stability and associated conditions. It can be obtained that projectile with flat nose has the best ballistic stability, followed by truncated-ogival nose, and ogival nose is the least at the same velocity. Additionally, a semi-empirical model based on a corrected drag coefficient is established to predict the depth of penetration.

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Wei Zhang
Harbin Institute of Technology

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