BALLISTIC SIMILARITY FOR GUN SHOTS WITH THE TRAVELING CHARGE

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Abstract: Ballistic similarity for gun shots in a hybrid scheme with traveling charge in the laboratory smooth-bore setups of 14.5 and 23 mm calibers has been shown experimentally. Based on the similarity principle, the authors have applied the results of shots in 23-millimeter barrel setup, which were firstly demonstrated the significant increment of the muzzle velocity due to the traveling charge, to get estimations for high-velocity projection in guns of 30 mm caliber. It is shown that at the nominal length of the barrel equal 2.06 m, the potential of traveling charge has not been fully realized. The elongation of the barrel up to 2.7 m enables one, keeping constant the maximum pressure at 320 MPa with the projectile of 88 g in mass, to increase the muzzle velocity up to 2100 m/s in the shots with the traveling charge. Comparing to the conventional charges of loose-packed density, it gives the muzzle velocity increment exceeding 400 m/s. These estimations have been explained.

Keywords: traveling charge; ballistic similarity; block charge; caliber; smooth-barrel setup; single-based propellant; muzzle velocity

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