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A New Firing Charge Concept of Increasing Intelligent Ammunition Muzzle Velocity

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Abstract: A new charge concept for increasing intelligent ammunition muzzle velocity based on differential traveling charge technology which is able to largely increase gun working volume utilization rate and muzzle velocity within the limits of given projectile overload was proposed. With adaption of sub-caliber sabot projectile design technology, this charge technique facilitates the design of high lift-drag ratio gliding projectile, and increases artillery range. A differential traveling principle interior ballistic numeric model was established. Assuming traveling charge mass 9.2 kg and main principal charge mass 13.41 kg, the calculation of 160 mm gun with the new charge technique demonstrates that the projectile muzzle velocity increases by 26% and gun working volume utilization rate increases by 28%, and under the conditions of maximum bore pressure up to 350 MPa, projectile bottom maximum pressure $p_{2m} \leqslant 318$ MPa, projectile mass 43.4 kg and travel 7.64 m. Through calculation with modified particle external trajectory model for 130mm sub-caliber gliding projectile, this charge technique can extend maximum range to 99 km.

Key words: intelligent ammunition; traveling charge; interior ballistics; differential principle; range extending technology
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高能量、低特征信号、低易损、低成本、低污染、灵活能量管理和高可靠性成为当前固体推进剂面临的紧迫课题,为促进其研究,本刊将于2015年开设推进剂研究专栏,以专题报道固体推进剂研究的最新研究进展。欢迎广大学者投稿,来稿时请选择对应的专栏。

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