

- [9] Coffee T P. A combined lumped parameter/one-dimensional blowdown model for the regenerative liquid propellant gun. Technical Report AD-A251779 [R], BRL-TR-3364, U S Army Ballistic Research Laboratory, 1992.
- [10] 金志明. 高速推进内弹道学[M]. 北京: 国防工业出版社. 2001.
JIN Zhi-ming. Interior ballistics of hypervelocity propulsion[M]. Beijing: National Defense Industry Press. 2001.
- [11] 黄明游, 刘播, 徐涛. 数值计算方法[M]. 北京: 科学出版社. 2009.
HUANG Ming-you, LIU Bo, XU Tao. Numerical computation method[M]. Beijing: Science Press. 2009.
- [12] 宋丕极. 枪炮与火箭外弹道学[M]. 北京: 兵器工业出版社. 1993.
SONG Pi-ji. Exterior ballistics of guns and rockets[M]. Beijing: Weapon Industry Press. 1993.

A New Firing Charge Concept of Increasing Intelligent Ammunition Muzzle Velocity

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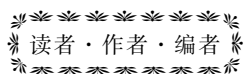
Abstract: A new charge concept for increasing intelligent ammunition muzzle velocity based on differential traveling charge technology which is able to largely increase gun working volume utilization rate and muzzle velocity within the limits of given projectile overload was proposed. With adaption of 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 $p_{2m} \leq 318$ 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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《含能材料》固体推进剂专栏征稿

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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