Elements in Analysis and Design, 2002,38: 927 – 936.

[3] Held M. The projectile forming charges[A]. 3rd International Symposium On Ballistic[C], Karlsruhe. Germany: [s. n.]. 1977,23 – 25.

[4] Summers R L, Walters W P. The behavior of shaped charges with open-poled hemispherical liners [J]. *Propellants, Explosives, Pyrotechnics*, 1991, 16(3): 140 – 144.

[5] 邓聚龙. 灰理论基础[M]. 武汉：华中科技大学出版社,2002.

[6] Radovitzty R, Ortiz M. Error estimation and adaptive meshing in strongly nonlinear dynamic problems[J]. *Comput Methods Appl Mech Eng*,1999,172: 203 – 240.

[7] ASM International, (Ed.), Metals Handbook, Vol.2, Properties and Selection: Nonferrous Alloys and Special-Purpose Materials, 1990.

[8] James S Peery, Daniel E Carroll. Multi-material ALE method in unstructured grids[J]. *Computer Methods in Applied Mechanics and Engineering*, 2000,187: 591 – 619.

[9] 邓聚龙. 灰预测与灰决策[M]. 武汉：华中科技大学出版社, 2002.

[10] 张先锋,陈惠武,赵有守,等. 聚能装药性能参数灰关联分析[J]. 兵工学报,2004,25(5): 525 – 528.
ZHANG Xian-feng, CHEN Hui-wu, ZHAO You-shou, et al. Gray relation analysis on the performance of shaped charges[J]. *Acta Armamentarii*, 2004, 25 (5): 525 – 528.

[11] 邓聚龙. 灰色系统基本方法[M]. 武汉：华中科技大学出版社, 2002.

[12] Huerta M, Vigil M G. Design, analyses, and field test a 0.7 m conical shaped charge[J]. *International Journal of Impact Engineering*, 2006, 32(8): 1201 – 1213.

[13] 隋树山,王树山. 终点弹道效应[M]. 北京：国防工业出版社, 2000.

Computational Analysis on Parameters of Shaped Charge Affecting Formation of Jetting Projectile by Numerical Simulation and Grey Relation Theory

ZHAO Hui-ying[1], SHEN Zhao-wu[1], WANG Xiao-hai[2]

(1. *Department of Modern Mechanics*, *University of Science and Technology of China*, *Hefei* 230027, *China*;
2. *Tactics Staff Room*, *Bangbu Tank Technique College*, *Bangbu* 233013, *China*)

Abstract: This paper analyzes the factors that affect jetting projectile formation of shaped charge through numerical simulation. Grey relational degree of each factor is obtained from grey relation theory. It is suggested that altitude, thickness of the liner wall and Apex angle of liner, as well as altitude of shaped charge are the main factors affecting formation performance of jetting projectile. Jetting projectile formation is controlled by thickness of the liner wall seriously; and the tip and tail velocity difference of jetting projectile is affected by Apex angle of liner. The analysis indicates that the grey theory is a useful way to determine line parameters in liner design.

Key words: engineering mathematics; shaped charge; numerical simulation; grey relation theory

读者·作者·编者

会议信息（一）

❖中国兵工学会第十三届测试技术研讨会将于 2006 年 8 月在乌鲁木齐召开,联系人:杨玉华 0351 – 3923640

❖中国兵工学会第十二届火箭导弹学术年会将于 2006 年 8 月在青海召开,联系人:尚雅娟 029 – 88293025

❖中国兵工学会空军弹药技术研讨会将于 2006 年 8 月召开,地点待定,联系人:黄正祥 025 – 84315454

❖中国兵工学会兵器控制学术研讨会将于 2006 年 8 月在连云港召开,联系人:钱龙军 025 – 84315309

❖中国兵工学会第二届国际民爆器材学术研讨会将于 2006 年 10 月在南京召开,联系人:宋敬埔 025 – 84315530

❖中国兵工学会第九届全国爆炸与安全技术学术交流会将于 2006 年 10 月召开,地点待定,联系人:陈鹏万 010 – 68912858

❖中国兵工学会火炸药技术学术研讨会将于 2006 年 10 月在深圳召开,联系人:任芊 010 – 68914662

❖中国宇航学会固体火箭推进专业委员会第 23 界年会将于 2006 年 8 月在呼和浩特召开,由航天科工集团四院 41 所和 46 所共同承办。

❖第七届全国爆轰学术会议将于 2006 年 7 月在贵州省贵阳市召开,中国力学学会爆炸力学专业委员会主办,北京理工大学承办,联系人：陈利 、刘彦：010 – 68915607；E-mail：liuyan@ bit. edu. cn

www.energetic-materials.org.cn 含能材料