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Characterization Method for Fragmentation Degree of Propellant Charge

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Abstract: To characterize the fragmentation degree of propellant charge quantitatively, the concepts of dynamic vivacity ratio and initial dynamic vivacity ratio (IDVR) were introduced. The dynamic vivacity ratio, which is the ratio of burning surface area of fragmented propellant charge to the corresponding not-fragmented propellants charges, and IDVR, which is the ratio of burning surface area of fragmented propellant charge to the corresponding not-fragmented propellants charges at the initial time were deduced using the gas state equations of the closed bomb. The close bomb tests were done with three kinds of petal propellants with 19 holes and different lengths of 13.6 mm, 10 mm and 5 mm. The $p-t$ curves of the propellants with different lengths were obtained. The IDVR of the corresponding propellants was gained by processing the $p-t$ curves. The initial surface area of propellants with different lengths was obtained via calculation based on the geometrical shape, and then the IDVRs of the propellants were obtained. Results show that the IDVRs' results of tests are close to the calculated values, showing that the IDVR of the propellant can denote the fragmentation degree of fragmented propellant charge quantitatively.

Key words: ordnance science and technology; propellant charge; fragmentation degree; dynamic vivacity ratio; initial dynamic vivacity ratio (IDVR)

CLC number: TJ55

Document code: A

DOI: 10.11943/j.issn.1006-9941.2015.01.012



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高品质炸药晶体的出现为钝感弹药的研究与应用开辟了一条重要途径,高品质炸药晶体因而也成为目前国内外含能材料研究领域的热点之一。为促进高品质炸药晶体的研究和应用,《含能材料》将于2015年开设高品质炸药晶体研究专栏,专题报道高品质炸药晶体的制备、表征、性能、应用等领域的最新研究成果,促进学者间的交流。欢迎相关研究学者投稿。来稿建议为英文。来稿时请选择对应的专栏。

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