LOW VELOCITY DETONATION IN CAST COMPOSITE ROCKET PROPELLANTS

A. A. Sulimov and B. S. Ermolaev

N. N. Semenov Institute of Chemical Physics of the Russian Academy of Sciences, 4 Kosygin Str., Moscow 119991, Russian Federation

Abstract: Initiation and conditions of realization of low-velocity detonation (LVD) in the cast polybutadiene rocket propellants based on ammonium perchlorate and having additive of RDX in amount of 35 and 20 %(wt.) have been studied. It is shown that under conditions of strong confinement and suitable initiation, LVD in these propellants propagates steadily along the charge at approximately constant velocity of 1.8–2.0 km/s. The detonation velocity did not change if the charge diameter was increased from 15 to 60 mm. Critical conditions of shock initiation of LVD have been determined. It is shown that in the cast polybutadiene propellants, LVD is initiated by shocks of 8–14 kbar. It is markedly lower than the critical pressure of initiation of normal detonation which equals 27–30 kbar. Relative ease of LVD initiation compared to the normal detonation mode together with rather high destructive ability of LVD enables one to conclude that it is the LVD onset should be taken into account at evaluation of risk of explosion during handling the composite solid rocket propellants with high explosive additive.

Keywords: low-velocity detonation; cast rocket propellant with RDX; shock initiation

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Contributors

Sulimov Alexey A. (p. 1937) — Doctor of Science in physics and mathematics, professor, chief research scientist, N. N. Semenov Institute of Chemical Physics, Russian Academy of Sciences, 4 Kosygin Str., Moscow 119991, Russian Federation; aasul@chph.ras.ru

Ermolaev Boris S. (b. 1940) — Candidate of Science in physics and mathematics, head of laboratory, N. N. Semenov Institute of Chemical Physics, Russian Academy of Sciences, 4 Kosygin Str., Moscow 119991, Russian Federation; boris.ermolaev@yahoo.com