LOW-VELOCITY DETONATION OF TATB HIGH EXPLOSIVE

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Abstract: Low-velocity detonation (LVD) of solid explosives attracts researchers' attention for developing propulsion and impulse devices of various purposes. The work presents research results on LVD in triaminotrinitrobenzene (TATB) explosive which is an insensitive material. It is shown that for TATB explosive at pressures below 6 GPa, the LVD propagation velocity is 2.4 km/s corresponding to the speed of sound in this material. In the 6–6.5-gigapascal range, the LVD propagation velocity increases to 4 km/s. Upon LVD propagation in a TATB explosive with 7 percent porosity, the pressure of 6 GPa is the threshold: above this threshold, partial chemical reaction (7%) is observed while below it, no chemical reaction occurs.

Keywords: low-velocity detonation; TATB

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Figure Captions

Figure 1 Experimental assembly schematic: *1* — electric detonator; *2* — RDX-based explosive bar, ∅ 5 × 30 mm; *3* — HMX-based booster charge; *4*— aluminum inert barrier, ∅ 60 mm; *5* — test samples of TATB explosive, ∅ 60 mm; *6* — plexiglas casing, 5 mm in thickness; and *7* — polyethylene waveguide

Figure 2 The LVD propagation velocity in TATB (*a*), TATB-based explosive (*b*), and HMX-based explosive (*c*): *1* — without case; and *2* — with case

Figure 3 Dependence of explosive transformation propagation velocity in TATB explosive on traveled distance: (*a*) 0.5 GPa; (*b*) 4.1 GPa; and (*c*) 5.8 GPa

Figure 4 Flyer plate velocity: *1* — 3.7 GPa; *2* — 6.2; and *3* — 11.9 GPa

Figure 5 Shock wave profile: (*a*) 3.7 GPa; and (*b*) 6.1 GPa

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