

Study on One-dimensional Shock Initiation Criterion of HNS-IV Explosive

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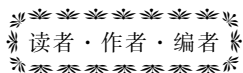
Abstract: To explore the applicability of the p - τ criterion, James criterion and Π - τ criterion to the one-dimensional shock initiation criterion of 2,2',4,4',6,6'-hexanitrostilbene (HNS-IV) explosive, and study the feasibility of one-dimensional shock initiation of HNS-IV by flyer shock initiation model. The three criteria were fitted combined with reported experimental data and the best criterion equation was obtained. The influence of polyimide flyer with different thickness on HNS-IV velocity threshold was simulated by AUTODYN software, and the fitting of criterion curves were carried out based on the simulation results. The feasibility of investigating the one-dimensional shock initiation of HNS-IV was explored by flyer shock initiation model. The simulation results show that there is a deviation between the simulation result of the velocity threshold and the experimental one, which is caused by the change of shape and thickness during the flyer driving. In the fitting results, The R^2 of p - τ criterion, James criterion and Π - τ criterion are 0.9813, 0.8715 and 0.9940, respectively. The fitting result of Π - τ criterion is the best, and the simulation result is consistent with the literature ones. According to Π - τ criterion, the best criterion equation obtained by literature data and simulation data is $\Pi=0.156+0.013/\tau$ and $\Pi=0.175+0.012/\tau$, respectively, two curves basically coincide with each other, indicating that investigating the one-dimensional shock initiation of HNS-IV is feasible through numerical simulation.

Key words: initiation criterion; 2,2',4,4',6,6'-hexanitrostilbene (HNS-IV); numerical simulation; detonation threshold; shock initiations

CLC number: TJ55; O389

Document code: A

DOI: 10.11943/j.issn.1006-9941.2018.06.006



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