Numerical Simulation of Velocity and Shape of the Flyer Driven by HNS-Ⅳ Explosive

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Abstract: To guide the detonating sequence design of the flyer driven by the impingement detonator, the numerical simulation method was used to calculate and obtain the velocity and shape of the flyer wih different materials (Stainless steel, titanium alloy, aluminum), different thickness (0.1-0.5 mm) and different diameter (3, 4 mm and 5 mm) driven by hexanitrostilbene-IV (HNS-Ⅳ) explosive. The calculation results show that at the same thickness, the velocity of the aluminum flyer is the highest, the velocity of the titanium alloy flyer is second, the velocity of the stainless steel flyer is the lowest, which is relative to their densities. For the same material, with increasing the thickness of flyer, the flyer velocity decreases gradually and tends to an extreme value. After detonation shearing of flyer with different diameter, the effective diameters of the fliers are reduced, in which, the effective diameters of *Φ*4 mm and *Φ*5 mm flyers are the same as those of 3.6 mm and 3.4 mm, respectively, and the *Φ*3 mm flyer is the smallest, only 2.8 mm. Under the action of detonation wave, HNS-Ⅳ explosive drives titanium alloy flyer with different diameter and 0.10 mm thickness, and the *Φ*4 mm and *Φ*5 mm flyers are slightly spherical, and the shape of *Φ*3 mm flyer is more flat. It is considered that the shock wave reflection drive is the main reason of its flat shape.

Key words: explosive driving; flyer velocity; flyer shape; hexanitrostilbene-Ⅳ (HNS-Ⅳ)
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