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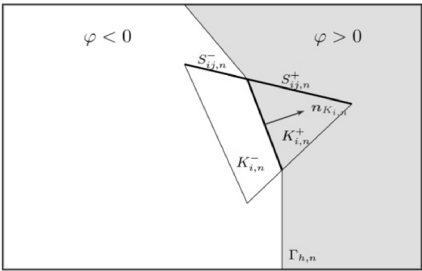
Advances in Shock Initiation and Detonation of Heterogeneous Solid Explosives

DUAN Zhuo-ping, BAI Zhi-ling, HUANG Feng-lei  
*Chinese Journal of Explosives & Propellants*, 2020, 43(3): 237-253.

The physical mechanisms of shock initiation, developments of macro-/mesoscopic reaction flow models, numerical simulations at meso-/trans-scale and continuum scale for heterogeneous solid explosives, and shock initiation experiments and measuring technologies were reviewed, some new findings and opinions from authors and team coworkers were summarized, and the future development trend was pointed out.

Numerical Simulation of Multi-material Compressible Flows Based on Riemann Problem and Its Applications in Two Dimensional Blast Wave Propagation

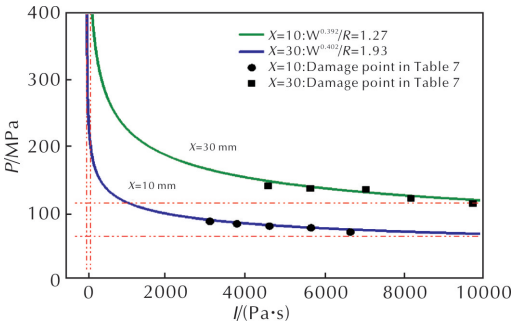
YAO Cheng-bao, FU Mei-yan, YAN Kai, HAN Feng  
*Chinese Journal of Explosives & Propellants*, 2020, 43(3): 254-261.



A general, efficient and error controllable Riemann problem solving method was proposed to solve the interaction problems of various fluids with highly nonlinear state equations such as JWL and polynomials, which can effectively improve the calculation accuracy of physical quantities on the material interface. Combined with the compressible multi-material flow scheme, a two-dimensional numerical system to simulate the multi-physical problem with high density and pressure ratio was established.

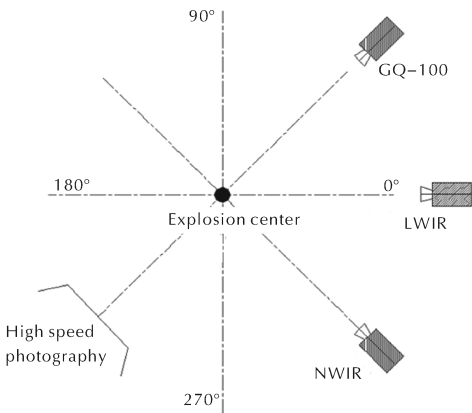
Damage Criterion of Underwater Explosion Shock Wave on Target

WANG Shu-shan, ZHANG Jing-xiao, WANG Chuan-hao, LU Xi, MA Feng  
*Chinese Journal of Explosives & Propellants*, 2020, 43(3): 262-270.



A general form of shock wave damage power parameter  $W^n/R$  was derived ( $W$  is the mass of the explosive,  $R$  is the explosion distance, and  $n$  is the coefficient to be determined). Based on the dimensional analysis, a relation between  $W^n/R$  and structural damage was deduced, and a general form of using  $W^n/R$  as the damage criterion for underwater explosion shock waves was proposed. Using software AUTODYN, the effects of shock wave in underwater explosion on circular plate and cylinder were simulated, and the iso-damage curves using different damage power parameters as the damage criterion were compared and analyzed.

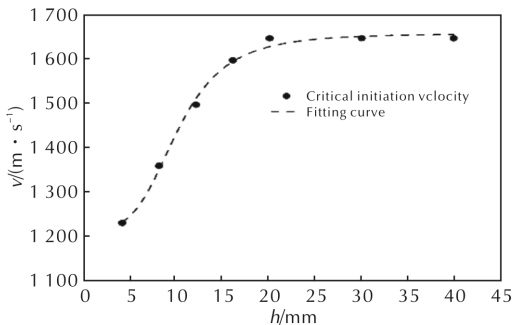
Study on the Energy Output Characteristics of Light Radiation from Aluminized Explosive Explosion



Through the experimental study of the light radiation characteristics of explosion, the time history curves of visible light and infrared light at different reaction stages of aluminized explosive charge were obtained and the energy utilization ratio of light radiation in different wave bands was calculated. Based on the explosion energy output structure of aluminized explosive, the light radiation energy output characteristics and excitation characteristics of aluminized explosive were also analyzed.

SONG Pu ,YANG Zhuo,ZHAO Xiang-jun,YANG Lei,LIANG An-ding  
*Chinese Journal of Explosives & Propellants* ,2020,43(3) ;271-275.

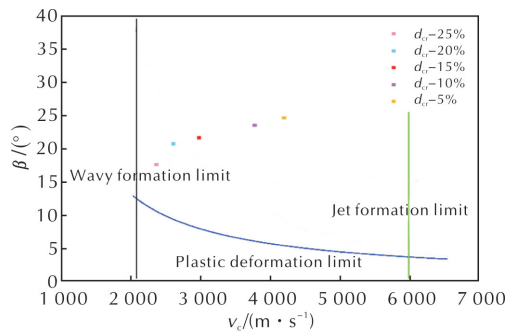
Effects of Back Plate Materials and Explosive Thickness on the Fragment Impact Initiation of 8701 Explosive Charge



The tests of single fragment and dual fragments impact initiation shielding 8701 charge were designed. The AUTODYN-3D software was applied to carry out the numerical simulation. The amplitude of back plate reflected wave was changed through changing the back plate material and the thickness of explosive, and the influence of back plate reflected wave on the initiation threshold of charge was explored.

LI Yi-ming,YANG Xiao-hong,YAO Wen-jin,ZHENG Yu,LIU Jun-hao  
*Chinese Journal of Explosives & Propellants* ,2020,43(3) ;276-281.

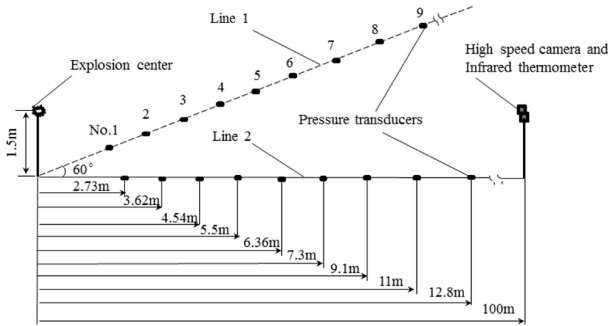
Application of Near Critical Thickness Emulsion Explosive in Welding of Metal Foils



The effects of the content of hollow glass microsphere(HGM) on the critical thickness and the near critical detonation velocity of emulsion explosive were investigated. Meanwhile, two groups of near critical thickness charges with HGM mass fraction of 20% and 25% were applied in the welding of TA2 titanium foil and Q235 steel, and the welding quality were analyzed and compared.

XU Jun-feng, MA Hong-hao ,SHEN Zhao-wu,YANG Ming,HUANG Ze-chun,ZHOU Heng  
*Chinese Journal of Explosives & Propellants* ,2020,43(3) ;282-286.

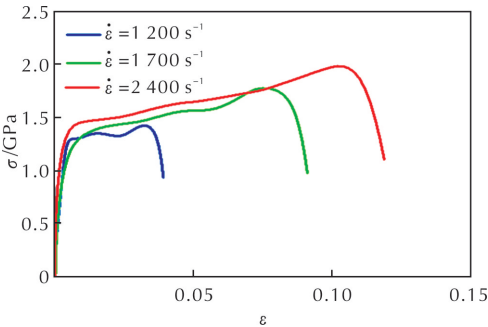
Explosion Test and Power Evaluation on Non-ideal Explosives



Explosion experiments of cyclotetramethylene tetranitramine (HMX) based aluminized explosive (AE) and TNT were carried out in free filed. The shock wave parameters and heat effects data were obtained through theoretical calculation and instrument acquisition. Based on the explosion effects, a method for evaluating the power of AE was proposed.

XU Qi-peng, ZHANG Yu-lei, LI Zhi-rong, SU Jian-jun, LIU Yan, HUANG Feng-lei  
*Chinese Journal of Explosives & Propellants*, 2020, 43(3): 287-292.

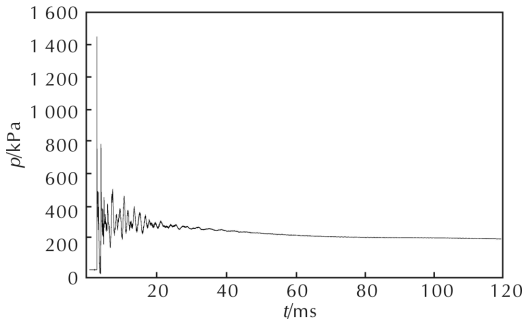
Correlation between the Mechanical Properties of Tungsten Alloy Fragments and Fracture Behavior Driven by Detonation Loading



The static crushing properties, dynamic mechanical properties and fracture properties after detonation of tungsten alloy fragments prepared by two different processes were tested. The scanning electron microscope was applied to metallographic study. Combining the original fragments and the recovered fragments after detonation loading, the integrity prediction of fragments after detonation loading was realized.

TANG Jiao-jiao, LIANG Zheng-feng, QU Ke-peng, ZHENG Xiong-wei, YAN Feng  
*Chinese Journal of Explosives & Propellants*, 2020, 43(3): 293-297.

Effect of Aluminum Particle Size on the Explosion Parameters of HMX-based Thermobaric Explosives in Confined Space

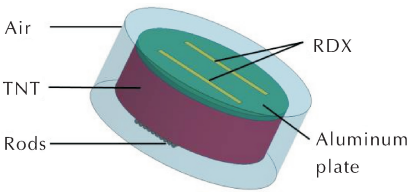


The explosion test was carried out for HMX-based thermobaric explosives with aluminum powder particle sizes of 2.7, 5.4, 23.8 and 96.9 μm and the pressure curve of the reflected wave after the explosion was measured in a spherical explosive tank using a pressure test system. Five characteristic parameters of peak pressure, impulse, quasi-static pressure, quasi-static pressure rise time and pressure attenuation coefficient of reflected wave were used to analyze the explosive energy output characteristics.

CHEN Kun, XIAO Wei, HAN Zhi-wei, HUANG Wen-long, LIU Ting, ZHENG Su-ping, WANG Bo-liang  
*Chinese Journal of Explosives & Propellants*, 2020, 43(3): 298-302.

Analysis of Rod-Fracture Behavior under the Effects of Detonation Wave Interaction

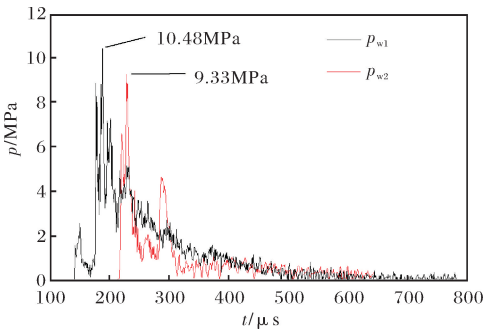
FANG Tao,LIANG Min-zu,LI Xiang-yu  
*Chinese Journal of Explosives & Propellants*,2020,43(3):303-307.



A detonation wave interaction effect experiment was carried out. Force distribution on the rod and fracture process were analyzed through numerical simulation, which was verified by experiment.

Experimental Research on the Explosion Performance of Explosives under Vacuum Conditions

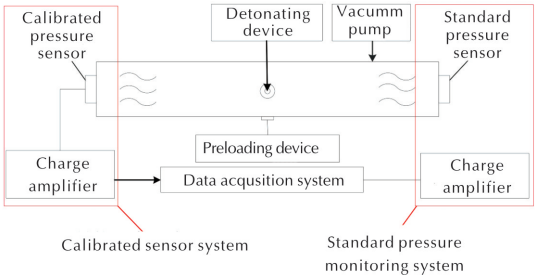
ZHANG Guang-hua, LI Biao-biao, SHEN Fei, WANG Sheng-qiang, WANG Hui  
*Chinese Journal of Explosives & Propellants*,2020,43(3):308-313.



The implosion experiments were applied for JO-8 explosive in a vacuum explosion tank and the implosion power of explosive under different conditions was analyzed.

Effects of Shell Thickness of Charge on Pressure Waveform in Water Shock Tube

SHI Yu-cheng,XU Chun-dong,KONG De-ren  
*Chinese Journal of Explosives & Propellants*,2020,43(3):314-319.



The effects of shell thickness on the characteristics of the shock wave pressure generated by the explosive in water shock tubes (limited waters) have been investigated by means of AUTODYN software and the results have been tested experimentally.

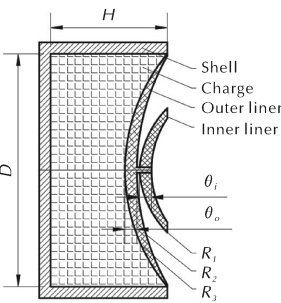
Influence of Plasma Initiation Conditions on Response Intensity of Insensitive Energetic Materials



XUE Le-xing, PAN Wen, FENG Bo, FENG Xue-song, ZHAO Juan, FENG Xiao-jun  
*Chinese Journal of Explosives & Propellants*, 2020, 43(3): 320-324.

The influence of the plasma initiation voltage and the contact area between plasma and insensitive energetic materials on the detonation response of insensitive energetic materials was studied. Molecular insensitive energetic materials were more sensitive to plasma initiation conditions than ionic insensitive energetic materials.

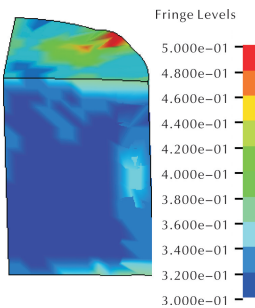
Numerical Simulation of the Influence Factors on the Forming Performance of Explosively Formed PELE



SUN Sheng-jie, WANG Shu-you, TAN Jie, JIANG Jian-wei, MEN Jian-bing  
*Chinese Journal of Explosives & Propellants*, 2020, 43(3): 325-329.

The forming process of explosively formed PELE was calculated using AUTODYN software. The influence of the liner materials, length to diameter ratio of the charge and the structure of inner liner and outer liner on the forming performance of explosively formed PELE was obtained. The compactness was defined using image processing techniques, which can be applied to evaluate the forming performance of explosively formed PELE quantitatively.

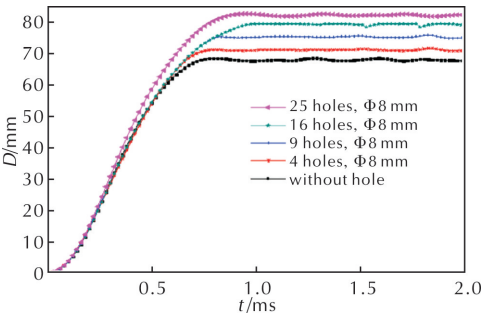
Impact Safety of Composition B under Thermo-Mechanical Coupling Condition



QU Ke-peng, SHEN Fei, XIAO Wei, LI Liang-liang, Lü Yong-zhu, DONG Shu-nan, CHEN Peng  
*Chinese Journal of Explosives & Propellants*, 2020, 43(3): 330-334.

The impact tests of Composition B specimen at different temperatures (−40 °C, 25 °C, 70 °C) with different sizes (Φ20 mm × 20 mm, Φ40 mm × 40 mm, Φ60 × 60 mm) were carried out by drop-weight loading device. The critical ignition threshold of Composition B at different temperatures with different sample sizes was obtained, and the strain distribution of Composition B with different sizes at critical reaction height was simulated. The influence mechanism of temperature and size on the critical ignition threshold of Composition B was discussed.

Study on the Coupling Effect of Fragments and Shock Wave of the Blast-fragmentation Warhead on Typical Targets



HOU Jun-liang, JIANG Jian-wei, LI Ying-bo, LIU Han, XIAO Hui-lang, XIAO Han  
*Chinese Journal of Explosives & Propellants*, 2020, 43(3): 335-340.

Deformation of flat plate with prefabricated hole and without hole under blast loading is studied by simulation and experiments. Holes density and diameters are investigated to gain the rule of coupling effects.

An Evaluation Method of Internal Blast Power in Aperatured Cylinder Device

$$T = \left( \frac{10I_{A1}}{I_{A1}(TNT)} + \frac{10I_{B1}}{I_{B1}(TNT)} + \frac{10I_{B2}}{I_{B2}(TNT)} \right) + \frac{30P_{qs}}{P_{qs}(TNT)} + \frac{20D_c^2}{D_c^2(TNT)} + \frac{20L}{L(TNT)}$$

The blast experiments and power evaluation of five kinds of bare explosive grains (TNT, pressed and cast aluminized explosives) were carried out using a closed cylinder device with a prefabricated strip hole at one end. The impulse, quasi-static pressure, thin plate central point deflection and strip hole crack length were selected as indicators to characterize the air explosion performance, implosion performance and thin plate deformation energy. Then an evaluation method of internal blast power based on the perforated cylinder device was proposed and applied to the five explosives by assigning different weights to the indicators.

LI Shang-qing, LI Zhi-rong, ZHANG Yu-lei, ZHAI Hong-bo  
*Chinese Journal of Explosives & Propellants*, 2020, 43(3): 341-344.

Research on the Blast Power Field Distribution and Gain of Two-point Array Explosion



The blast power field of two-point charge at different array distances was simulated by AUTODYN software. The influence of the array distance on the explosive shock wave power of two charges was analyzed. The overpressure action area gain of two-point array charge was studied. And the relationship between the overpressure action area gain and the distance of two charges was obtained.

FENG Hai-yun, HU Hong-wei, XIAO Chuan, LI Guang-jia, SONG Pu  
*Chinese Journal of Explosives & Propellants*, 2020, 43(3): 345-350.





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