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Equation of State of Detonation Products for TNT by Aquarium Technique YONG HAN, CAEP — During explosive detonation, the detonation pressure (P) and temperature (T) will decay quickly with the expansion of detonation products, and the damage effect is determined by the thermodynamic state of detonation products under high pressure. The traditional and important method for calibrating the parameters of thermodynamic state is cylinder test, but the results showed that when the cylinder expanded to a certain distance, the cylinder wall would break up and the detonation products would jet out, which would affect the accuracy of the calibration parameters of thermodynamic state. In this paper, the aquarium technique was used to study the detonation product thermodynamic state of TNT explosive, obtaining the shock wave track under the water and the trace of the interface between water and detonation products in the specific position with the high speed rotating mirror camera. By thermodynamic calculation program BKW and VHL, the parameters of equation of state were obtained. Using the parameters and the dynamic software LS-DYNA, the underwater explosion of TNT was simulated. Comparison with experimental results shows that the thermodynamic state parameters which is calculated by VHL is more accurate than that of BKW. It is concluded that the aquarium test is a more effective method to calibrate the thermodynamic state than cylinder test.

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