The projectile impact initiation of the cased high explosive charges

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The article describes the results of numerical simulation of the process of shock initiation in the charges of explosive, cased in steel shells with the thickness of 4 and 12 mm, by cylindrical projectiles weighing 18.6 g moving in the speed range of 750 – 2,300 m/s. The powerful shock waves that can initiate detonation are generated when the cased high explosive charges are exposed to high-speed projectiles. Whether there will be detonation or not, depends not only on the amplitude and duration of shock wave, which in turn are determined by the speed and the diameter of the projectile, but also on the nature of the restrictions. It was found that under the influence of the projectiles on charges of explosives in thin shells the detonation occurs in the shock waves produced at the initial stage of minimum-delayed shock interaction, and under the impact of the projectiles on charges of explosives in thick shells the detonation initiation at the limit occurs with a noticeable delay as shock waves reflected from shell wall are crossing. Since the pressure in the reflected shock waves is twice as much as the pressure in the incident shock waves, the critical projectile velocity needed for initiating detonation of explosive charges in a thick-walled shell is proved to be less than for explosive charges in a thin-walled shell. Numerical techniques that can be used in future studies for determining the critical conditions of shock wave detonation initiation in various cased explosive devices were developed.

Keywords: *cased high explosive charge, detonation initiation, shock wave, numerical modeling, decomposition kinetics.*

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