Study of explosive detonation using laser heterodyne technique

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As is well known, the sensitivity of an explosive depends on the charge structure [1]. As the number of inhomogeneities increases, for example, when the explosive grains are crushed, sensitivity can change significantly. This dependence is explained within the framework of hot spot theory, since it is at these inhomogeneities that a chemical reaction develops. The influence of charge structure on the detonation wave should also be present in the case of normal detonation. This study experimentally investigated the effect of the manufacturing method and modification with carbon nanotubes on the mass velocity profile of TNT charges. Samples were manufactured by pressing, layer-by-layer casting, and pressing with the addition of 0.5% single-wall carbon nanotubes. Profiles were recorded using a laser heterodyne technique with high temporal resolution. Two window materials, PMMA and LiF, were used, and data processing was performed using the fast Fourier transform method. A comparison was made with published data obtained in a similar setting.

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