Radio interferometry of shock-wave and detonation processes

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Meaningful progress can be reached in studying fast processes by implementation of noninvasive methods. Most advanced are remote interferometric methods without flow distortion, particularly, laser interferometry and radio interferometry. Radio interferometry to study shock-wave and detonation processes is applied at RFNC-VNIITF from the mid 1980s of the past age. Radiowave diagnostic method offers some significant advantages as compared to other experimental methods. The most important advantage of this method is its capability of continuous recording the motion of shock and detonation waves in optically-opaque materials, among which are almost all solid explosives (HE) and non-metallic structural materials. In some cases the radiowave method can replace at once several measuring techniques, increasing essentially the informativeness of investigations. The paper presents experimental setup to study dynamic compressibility of radiotransparent materials, including HE, and also methods to identify parameters of an equation of state for explosion products using the radiowave method. Main factors, which affect shock wave transition to detonation wave in HE were identified by radiointerferometry. HE-driven throwing of impactors and shells is studied and results of this study are given. High sensitivity of radiointerferometry to motion of different interfaces, researchability in optically-opaque media, as well as continuity of obtained data allow much room for experimental studies.