A wide-band microwave radiation generated by high explosives

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Several experimental facts shown, that microwave radiation ($f = 10^8$–10^{11}Hz) is generated during high explosive (HE) charge detonation process, with charge weight being$M=10^2$–10^4g. The radiation intensity exceeds an intensity of thermal radiation. In the process of expansion of HE products the concentration of electrons behind a shock wave decreases, and microwave radiation falls outside the limiting resonator. The mechanism of radiation [1] will take effect after some delay from the moment of HE initiation, and this delay time is proportional to HE weight. If nonlinear effects is absent, the average frequency of radiation should decrease during a pulse. A type of HE, a charge geometry, existence of a shell, a way of initiation, as well as external pressure are the important parameters, influencing on the mechanism. To obtain wide-band microwave radiation, the optimal HE composition should be used. The radiation should be registered with a certain delay. The delay depends upon the moment, when the detonation wave comes on the charge surface. Our recent experiments demonstrated time delays in agreement with the mechanism.

[1] Cherepenin V A and Shumilin V P 1998 Mechanism of wideband microwave radiation at explosion of condensed high explosives *JOURNAL OF RADIO ELECTRONICS* vol 1 ed Gulyaev Y V (Russia) pp 3–6