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# BASIC EXPERIMENT ON ELECTROMAGNETIC IRRADIATION CAUSED BY HYPERVELOCITY IMPACT

**Abstract**

Electromagnetic irradiation caused by the hypervelocity impact has been reported, but the mechanism is not understood. Also, hypervelocity impact will result plasma generation and potential variation of the target. We are studying the subject by the synthesizing approach of the above electrical phenomena caused by the hypervelocity impact. We carried out the impact experiment using a two-stage light gas gun and simultaneous observations of the electromagnetic wave, impact plasma, light emission, and electrical potential variation of the target. Also, we recorded the impact phenomena using the high speed video camera with a frame speed of 2 micro seconds. Aluminum plates and glass plates were used as targets. Velocity of the projectile with a diameter of 7mm that was made by nylon 66 was around 6 km/s. We used linear polarized antennas and heterodyne receivers in order to measure the electromagnetic wave with frequencies of 300 MHz, 2 GHz, 5.8 GHz, and 20 GHz. Several set of horizontal polarized and vertical polarized antennas that were located inside and outside of the impact chamber were used in order to measure the orthogonal polarized waves, simultaneously. RF signals were observed after the impact. Almost same wave forms of RF signals were obtained by horizontal polarized and vertical polarized antennas. We estimated circular polarized characteristics of the emitted electromagnetic waves by hypervelocity impact. Duration time and band width of the electromagnetic waves were analyzed. Also, we measured the impact plasma by the double probe system and electrical potential of the target. Detailed results and evaluation correlation among electrical phenomena by the impact will be presented.