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SIMULATION OF SHOCK WAVE PROPAGATION IN POLYMER TARGETS, TAKEN INTO ACCOUNT OF THE INTERACTION OF CATHODE AND ANODE PLASMA IN THE DIODE GAP OF THE HIGH-CURRENT ELECTRON ACCELERATOR "SQUID" *)

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To study the strength characteristics of various materials, experiments are carried out on the interaction of high-energy electron beams with targets made of these materials [1]. As a result of the experiment, it is possible to assess the degree of surface destruction, the presence of chips on the back side, and measure the pressure exerted on the target. Modeling of such experiments often does not take into account some features of installations and additional external factors. In this work, we simulated the interaction of an electron beam with a target, the subsequent appearance of anode and cathode plasmas, the interaction of these plasmas in the diode gap, and the influence of this interaction on the propagation of shock waves inside the target.

The experiments were carried out on the Squid high-current electron accelerator (current up to 40 kA, voltage up to 350 kV, pulse duration about 100 ns, electron energy in the beam about 0.35 MeV). Using measurements of the total voltage drop, the electron beam current was calculated, which was subsequently used in the simulation. Chronograms of the propagation of shock waves inside the target were obtained.

Modeling of the effect of REB on the sample under study was carried out using the method developed at the Institute for Problems of Mathematics named after. M.V.Keldysh RAS MARPLE code [2], supplemented with a cathode model [3]. Calculations were carried out in the approximation of a single-temperature 3-dimensional hydrodynamic model, taking into account thermal conductivity and volumetric energy losses due to bremsstrahlung. Calculations were performed using wide-range equations of state of matter.

The mathematical modeling results of the processes occurring in the Squid generator's of high-current beams of relativistic electrons diode gap were obtained and analyzed. The influence of the interaction of plasma flows from the anode and cathode on the nature and propagation speed of shock waves inside a polymer target has been studied. The simulation results coincide with the experimental data.

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