Near-surface matter density distribution of copper cylindrical conductors at skin explosion

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Plasma formation on the surface of a conductor is a key problem in terms of the energy deposited in a metallic substance. The experiments were carried out on a high-current MIG generator (current amplitude up to 2.5 MA, current rise time 100 ns). The internal structure of the near-surface plasma, the estimate of the density of matter in it, and its radial distribution were studied using X-ray radiography based on the X-pinch. The distribution profile of a substance along its radius at different points in time was modeled using the developed calculation program using the Abel transform. Dependences of on the radius of a copper conductor are obtained in a selected section of the X-ray diffraction pattern of its explosion. The value of the mass radiation absorption coefficient was determined from the X-ray transmission patterns of stepped filters made of the same conductive material as the exploding one. The dependences of the density of the conductor substance on its radius at various moments of time from the beginning of the current are determined and plotted.