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MODELING OF DIFFRACTION ON AN ELECTRIC SPARK IN THE FIRST RYTOV APPROXIMATION *)

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The diffraction of a plane wave with a wavelength of 532 nm on an electric spark has been simulated in the first Rytov approximation. The Rytov approximation is characterized by high sensitivity to phase objects [1], which makes it especially promising for use in optical tomography [2] and the study of anisotropic materials [3]. The spark model is a rounded two-dimensional region on which axially symmetric microstructures are stochastically distributed. The spark diameter was taken to be 300 μm, the microstructure diameter was taken to be 20 μm. The number of microstructures used was 40. These parameters are in good agreement with the experiment [4]. The distribution of electron density in microstructures was described by a harmonic law with a concentration maximum of $5*10^{19}$ cm^{-3} [5]. Graphs of the dependence of intensity and phase shift behind the object at a distance of up to 1000 μm from the spark output plane were constructed. The corresponding interference and shadow patterns were calculated. The obtained results reflect the actually observed structures and can be useful in processing experimental interferograms [5].

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