distinctive Features of processing the spark channel interferograms taking into account their spatial structure

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The method of smooth perturbations is used to process the interferograms of small (5–100 μm) objects with allowance for diffraction of the probing radiation. The requirements for preprocessing experimental data and features of the processing algorithm are determined, being observed, the accuracy of the final results can be improved. Experimental interferograms are analyzed under the assumption of cylindrical symmetry of the plasma object: two-dimensional phase shift maps are obtained, as well as the electron density distribution for the plasma object is formed at the initial stage of the nanosecond discharge.

To analyze the areas of experimental interferograms, which are difficult to process by the method of smooth perturbations, modeling of interferograms is used by solving the Helmholtz equation for the phase shift for characteristic densities and geometries of objects, the most probable parameters of the objects under study are estimated.

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References

1. Kukhta V.R., Lopatin V.V., Petrov P.G., Opt. and spectrum., 1984, 56, no. 1.
2. Rytov S.M., Kravtsov Yu.A., Tatarsky V.I., Principles of Statistical Radiophysics 3: Elements of Random Fields, Springer-Verlag, Berlin, 1989, part 2.
3. Parkevich E.V., Khiryanova A.I., Agafonov A.V., Tkachenko A.V., Mingaleev A.R., Shelkovenko Т.А., Oginov A.V., JETP, 2018, 126, 423.
4. Khirianova A.I., Parkevich E.V., Tkachenko S.I. Phys. Plasmas, 25 (7) (2018) 073503