

Diffraction interferometers based on zone plates. Part I

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Abstract

The authors have developed four schemes of two-beam Fresnel-type diffraction interferometers with combined branches based on zone plates with the additional functions for visualizing optical inhomogeneities. They propose a unit for filtering non-working diffraction orders and circuit designs allowing to influence the interference field characteristics effectively. The authors describe and compare the characteristics of interferometers, determine procedural and instrumental errors of all designs. They propose the methods for processing interferograms for each of the designs. It is shown that the proposed interferometers allow to visualize optical inhomogeneities of transparent samples and measure them with a sensitivity of ~ 0.05 of the light wavelength, and can be successfully used for research and quality control of laser crystals and other optical materials.

Keywords: diffraction interferometer, Fresnel-type diffraction, optical inhomogeneity, non-working diffraction, wavelength, laser crystal, optical material.

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