COMPUTER VISUALIZATION OF THE STRUCTURED LASER RADIATION REFRACTOGRAMMS

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ABSTRACT: For experimental research of physical processes in liquids and gases can be used the method of laser refractography consisting in probe the medium of interest with structured laser radiation, record the radiation passing through the medium with a CCD camera, and process with the aid of a computer the refraction patterns captured with a view to finding out the properties of the medium [1]. Refractogramms are simulated by solving equations of geometric optics as applied to inhomogeneous mediums. However, presence a complex beam pattern in the medium, formation of caustics and need to consider the diffraction effects, geometrical optics approach is untenable and requires wave methods using.

For this purpose the authors developed a method of calculating laser refractogramms based on solving wave equation. Calculating refractogramms in relation of geometrical optics and Fresnel diffraction have problems associated with the requirement of large computational resources because of rapidly oscillating function under the integral sign. This paper is devoted to the implementation of the algorithm in the programming environment Delphi, which reduces the calculation time. The typical laser refractogramms are shown calculated for the plane and linearly-structured laser radiation propagated through cylindrical and planar inhomogeneous layers (Fig.1).

The simulation results can be used in laser diagnostics of optically transparent inhomogeneous media.

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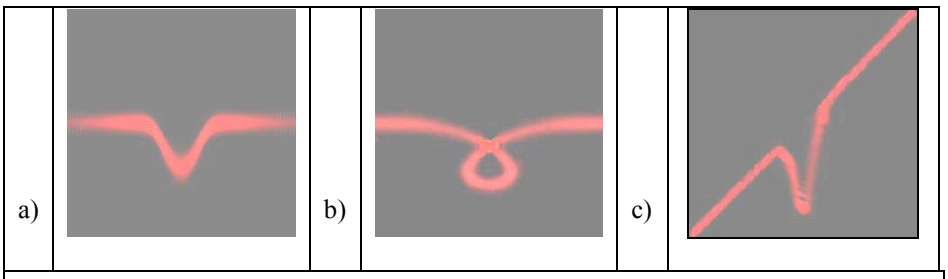

Fig. 1 Refractogramms calculated for the plane-structured laser radiation propagated through : a, b - a cylindrical inhomogeneity, c - plane stratified inhomogeneity

References

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