(Fig. 2). The estimated lifetime of $^4I_{13/2}$ energy level of Er^{3+} ions in the layer is 3. 4 ms, that is well agree with the lifetime in Er (0.5 at. %):$KY(WO_4)_2$ bulk crystal. Thus, the manufactured epitaxial layers should be used as active media in planar waveguide lasers emitting at 1.5–1.6 μm.

UDC 535:31

FEATURES OF ABERRATIONAL ANALYSIS OF ELLIPSOIDAL REFLECTORS TO OPTICAL BIOMEDICAL DIAGNOSTIC

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To optimize the capability of non-imaging optics, including transmission properties, necessary to develop the quality criteria for evaluating of its work, depending on the chosen configuration. Given the structure of photometers with ellipsoidal reflectors (ER) [1] typical quality criteria cannot be used. Therefore, allowing for the light transfer in ellipsoid of revolution with internal mirror surface, is presented result of aberrational analysis based on ray tracing. This will find the optimal solution of many problems in applied optics of light scattering in biological media (BM) by photometer with ER. Using mathematical basis [1, 2] analyzed the process of defining the optimum parameters of ER for its application in experimental photometric system for determining the optical properties of BM. In terms of biophotonics, it due to the need to register the maximum-possible amount of forward and backscattered light. Therefore, correct selection of ER parameters such as eccentricity and diameter of the working window based on the projected numerical experiment within the spatial distribution of scattered radiation from position of aberrational quality is very important. The modeling was made on variable values of focal parameter and eccentricity from the initial point A (2, 0). During the simulation was calculated Centroid (Fig. 1) and RMS (Fig. 2) for total and first reflection on X-axis.

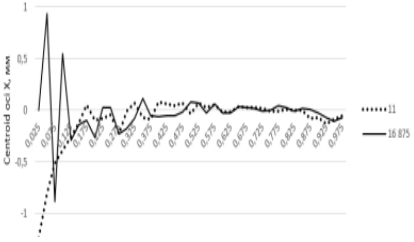

Fig. 1

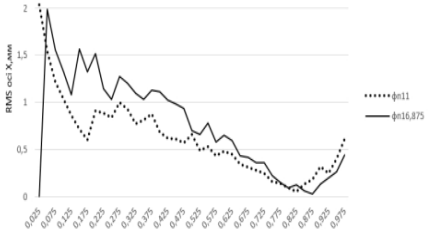

Fig. 2

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UDC 535.3

LIGHT SCATTERING OF HUMAN SKIN AT ELLIPSOIDAL PHOTOMETRY

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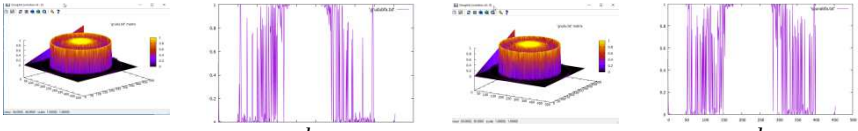
Ellipsoidal photometry as a method of optical diagnostics of scattering biological media [1] can be used to research in reflected and transmitted light. This paper discusses possibility its applicability for making a wide class of diagnostic non-invasive tools for dermatological analysis. Given the applying object – human skin – was selected the technical solution of reflectometer setup with ellipsoidal reflector with truncated orthogonal focal planes [2]. This design provides accurate measurements in backscattered light and satisfies the main task – non-invasive. For evaluation the possibilities of photometric system was carried out simulated of its work in relation to biological object. The numerical experiment was implemented for six samples of human skin: palm, breast, abdomen, back, shoulder and hip. Skin multilayered media was represented by stratum corneum (absorption coefficient 0.1 1/cm and scattering coefficient 100 1/cm fot wavelength 632.8 nm), epidermis (0.15 and 45), dermis (0.073 and 20), fat (0.068 and 15), and muscle tissue (2 and 215).



a *b* *c* *d*

Spatial distribution *a/c* and central cross section *b/d* of forward and backscattered light in breast skin respectively

Muscle tissue is specific model layer in first case was not taken into account, and in second – was set to thickness with impossible for light transmission. Zone analysis of photometric images at ellipsoidal photometry [3] does not given acceptable results. Therefore, was proposed analysis principles of scattered in multilayered media of optical radiation by the central cross section.