it reflects the structure of biological tissues of the organism in transaction with high distributive capacity that provides the obtaining morphological information on microscopic level. It shows that in the process of analysis of macular area tomograms, obtained by means of optical coherence tomography, a number of drawbacks, connected with exact determination of transition boundary between macular of the retina and vitreous body revealed that stipulated the necessity of development the technique of high accurate processing of the obtained tomograms.

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VIDEO-POLARIMETRIC SYSTEM FOR OPTIMIZATION OF DATA ACQUISITION TO IMPROVE THE ACCURACY

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The analysis of the polarization of light is usually carried out using modulation schemes. In this case, optical components rotate at a particular frequency and the unknown output state of polarization of light is determined by several measurements. One of the most widespread methods of modulation uses a rotation quarter-wave plate, and a fixed linear polarizer. Such arrangement makes it important the advancement of efficient calibration techniques. The optimization of the set of measurements is closely

related to the improvement of the quality of imaging and henceforth the likelihood of better diagnose.

Actuality. Identification and treatment of cancer are still one of the biggest challenges in modern medicine and has received considerable attention of the researchers [1, 2, 3]. The probability of survival increases considerably with early detection. Hitherto, biopsy is the standard technique to diagnose potential lesions. However, this procedure may skip injuries when they are at an early stage. Polarimetry methods can improve diagnostic accuracy, on the one hand, and to reduce hardware costs at the other [4]. Analysis of video-polarimetry systems can be found in the literature [5], from which one can conclude that they are potentially powerful tools. However, it is very difficult to measure the polarization of light, reflected from the samples. Calibration procedures provide an opportunity to minimize the effect of systematic and random errors that occur when moving the optical components. Therefore, the determination of the optimal set of measurement angles is an important task in the development of calibration and measurement processes of video-polarimetry devices.

Solution. The Stokes parameters S and the degree of polarization depict the polarization of light. Mueller matrix M permits the description of effects of optical elements on the polarization of the light beam. The effect of a set of optical elements on the polarization of light is given by the product of individual matrices Mi, with matrices arranged in reverse order. The deviation of the vector Θ has a different effect on the error of each component of the Stokes vector measured. This difference is shown in fig. 1. For this reason, it is advisable to look for the upper limit of the error instead of the error of each component of the Stokes vector.

These angles provide the lowest value of the maximum relative error when establishing the parameters of the incoming to the PSA light. In the course of the simulation, it was found that the maximum relative error was as great as 26 for some values of the azimuth angles. This fact shows the positive effect of the application of the method has on the value of the measurements. In addition, fig. 4 shows a rapid convergence to the final value.

The robustness of the algorithm was carried out with a series of executions. At these executions the offset was kept constant and the maximum relative error was compared. The average value of the relative error was 0,39 and a standard deviation - of 0,29

Conclusions. The proposed method of optimization of the image data acquisition in video-polarimetry based on an evolutionary algorithm allows to minimize the maximum relative error of the parameters of the

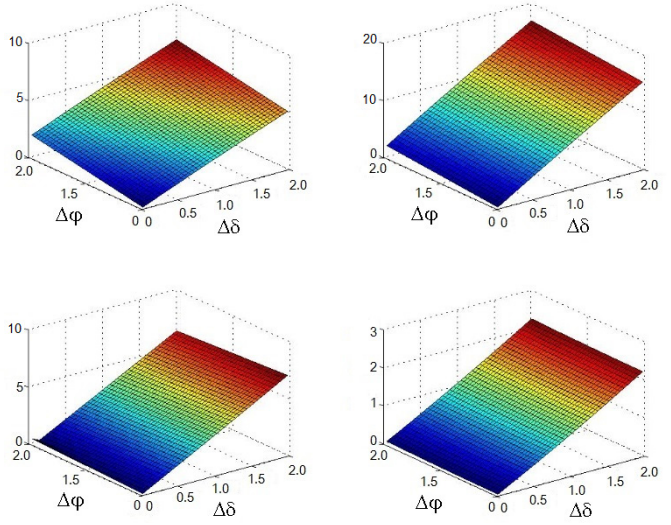

Fig. 1. Comparison of the relative errors on the Stokes parameters due to different offset values

Stokes vector of the incoming light. The proposed technique can be applied in the assessment of both errors due to mechanical artifacts and image acquisition. The results might be employed to the calibration of imaging polarimetry devices for bio-tissue study.

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