

ABSTRACT

The master's dissertation consists of the introduction, 5 sections, the conclusion, the list of used literature and annex. The full volume is 86 pages contains 31 illustrations, 28 tables. Total processed 41 literature sources.

Purpose: increasing the information content of medical thermograms by thermostabilizing the optical system of the thermal imager and introducing software tools for processing thermograms.

Main results: Defocusing problem of thermograph lens under the ambient temperature effect is considered in this article. Optical scheme of the IR triplet is propose, which parameters are calculated using the method of passive optical athermalization. Based on the proposed method of thermograph thermoresponsive lens filling and further optimization was designed ternary diagram of temperature-compensated infrared lens matrix with a dimension of 320x240 pixel 25x25 mkm. Thanks to this method, and the calculations in the mathematical software Mathcad has been received a number of termaltake triplets infrared spectral range combinations of 8-14 microns. At the same time was achieve thermal stabilization and system achromatization. High image quality of the lens is confirmed by the level of modulation transfer function of 50% at a spatial frequency of 20 mm⁻¹ for the field of the system view edge and the function of energy concentration level of 66% in the spot size dispersion of 25 microns on the edge of the optical system view field. The stability characteristics of the lens makes it possible to more accurately determine the temperature gradient adjacent portions of the surface of the object and the diagnosis when the temperature of the external environment. Synthesized three-component lens has stable characteristics and high resolution in the temperature range from 0 °C to + 50 °C in the case when there is no temperature gradient inside optical system.

Is realized statistical processing of temperature indices. The most effective method of segmentation of thermograms in diagnosis, which increases the quality of visual assessment. The detailed algorithm of the obtained method is given. An

algorithm for the K-mean for processing thermograms is described and implemented in the MATLAB environment. Is proposed the method of programmed treatment of thermograms for the detection of pathologies, which increases the efficiency of diagnosis. The accuracy of the proposed method for increasing the informativity of thermograms is confirmed by comparison with the actual data of patients after surgical interventions.

The results of implementation: received the next approbation: published 4 articles; received 2 patents of Ukraine; existing 5 theses of reports at scientific conferences.

Key words: thermograph, lens, thermal defocusing, passive athermalization, thermography, segmentation, k-medium algorithm, medical diagnostics.