ABSTRACT

**Actuality of theme.** The optical system is the main component of the modern direction of photonics development. The US Photonics Development Program has forecast that the US photonics market will double every four years and reach $ 500 billion in 2013. Then it will double every two years. By 2015, the photonics market will reach $ 1 trillion.

The main parameter characterizing the quality of the optical system according to ISO 12233 is the optical transfer function and its components: modulation transfer function and phase transfer function. Developing a methodology for determining these characteristics and analyzing the expected accuracy of their measurement is an urgent task.

**The purpose and objectives of the study**. The purpose of the work is to compare the existing methods of quality control of the image of optical systems and to evaluate the factors that affect the measurement accuracy.

To achieve this goal, the following tasks were set:

- review the image quality criteria of optical systems;

- to analyze the capabilities of bench equipment for determining the quality of the optical image

- determination of errors of modern stands of the image quality control and estimation of their influence on accuracy

**Object of study**. Lens image quality control

**Subject of study**. Techniques for controlling the quality of lenses

**Research methods.** Analytical ratios were used to characterize the image quality of the lenses. In particular, the Fourier transform for the calculation of the components of the optical transfer function (OPF). The determination of the rational parameters of bench equipment measuring OPF was carried out according to the results of mathematical modeling. The evaluation of the precision parameters of the bench equipment was made taking into account the provisions of the theory of accuracy.

**Scientific novelty of the obtained results.** A mathematical modeling technique is proposed for determining the rational parameters of the bench units for measuring the components of the OPF with an error not exceeding 5%. The influence of the design parameters of the bench equipment on the results of measuring the OPF with the required accuracy is analyzed. A startup project based on research results has been developed.

**Publications.**

1. Kyrychuk BV Numerical image quality evaluation criteria. Proceedings of the Scientific and Practical Conference "Looking into the future of instrument making" Kyiv, Faculty of Instrument Engineering, 2018.

2. OK Kucherenko, BV Kyrychuk Determination of the aperture parameters in the stand for measuring the optical transmission function of the lens. "Measuring and computing technology in technological processes" . №2. 2019

3. OK Kucherenko, BV Kyrychuk Determination of infrared lens positioning requirements when measuring modulation transfer function. Bulletin of Khmelnitsky National University. №6. 2019.

**Structure and scope of the thesis.** The dissertation consists of an introduction, four sections, conclusions, a list of sources used. The total volume of work is 89 pages, with the main text of 83 pages. The dissertation contains 32 drawings, 24 tables, a list of used sources of 24 titles on 3 pages.

**Keywords**: optical transfer function, modular transfer function, phase transfer function, linear time-transfer device, microbolometer camera, value expansion function, rather large aperture, accuracy of use.