Abstract
The master's thesis consists of an introduction, four sections, a general conclusion, a list of literature and applications. The dissertation contains 107 pages, 56 illustrations, 29 table and 21 references. The total volume of work is 119 pages.
The actuality of the topic. The overwhelming number of existing thermal imagers on the market have a constant value of the angular field of view. In practice, the use of thermal imagers often requires resizing the monitor. Such a change is provided either by the optical method or by the use of appropriate image scaling programs on the monitor screen. However, the optical method allows you to provide the desired resolution of the thermal imager at different angles of its field of view, without losing or reducing the resolution. Zoom lenses have relatively high cost and cost. Because of this, there is a need to add to the less expensive thermal imagers with a permanent field of view of the optical nozzle, which would provide them with the function of a zoom lens. Such a nozzle may be a device with a zoom-afocal optical system. A smooth or discrete change in the angular magnification of the telescopic zoom-afocal nozzle system is capable of providing the imager optics with zoom-zoom properties with a corresponding field of view angle change and an optical image zoom on the monitor.
Purpose: To create an optical attachment system for thermal imagers that provide them with additional optical zoom function.
Objectives:
1. An overview of existing afocal optical zoom systems with an analysis of their advantages and disadvantages.
2. Substantiation of the choice of the structure of the lens zoom-afocal optical system, which would provide the imager with a change of field of view in a given range and minimally simple mechanism of movement of optical components. 6

3. Parametric synthesis of the zoom-afocal optical system with optimization of design parameters and development of the mechanism of movement of optical components.
Object of Study: To provide a change in the angular field of view of an optical thermal imaging system with a stationary standard lens and a constant field of view.
Subject of research: Optical zoom-afocal lens system for changing the angle of view of a standard lens of an imager.
Research methods. The following tasks were used in the work: Gaussian optics theory, theory of optical telescopic systems, theory of third-order aberrations, computer modeling of functions of zoom-afocal telescopic system, methods of parametric synthesis of lens components of the system, modern methods of optimization of structural parameters, computer program for the analysis of optical systems ZEMAX.
Scientific novelty of the obtained results:
1. The method of parametric synthesis of three-component and four-component zoom-afocal optical systems with the outlet pupil (aperture diaphragm) taken out of them is developed. Functional capabilities of such systems are shown. The laws of motion of the optical components of these systems are found.
2. Practical value of the obtained results: formulas and graphs are obtained, which allow to perform dimensional calculations of optical systems of three-component and four-component zoom-afocal systems at a given range of angular magnification, a given location and diameter of the inlet pupil of the standard lens of the imager, and the possibility to obtain increase the thermal imager while maintaining the quality of the observed object image.
Testing of dissertation results: 7

The main results of the dissertation are presented in reports at two scientific-technical conferences and journal publications:

1. Third Ukrainian Scientific and Technical Conference "Special Instrumentation: Status and Prospects" December 4-5, 2018 Kiev.
2. XVIII International Scientific and Technical Conference "Instrument making: the state and prospects" May 15-16, 2019, Kyiv
3. International Scientific and Technical Journal "Scientific News of KPI", issue № 3 2019

Keywords: three-component and four-component zoom-afocal system, synthesis of zoom-afocal lens systems.