

Abstract

Doctoral thesis: **Contributions to the study of optical systems in optoelectronic devices, with applications**, is a research dedicated to optical systems with adaptive optics, video camera and special lighting sources for video inspections and image recording methods. The aim of the work was developing the methods, and techniques for registering high-quality images, particularly, when analyzing various document surfaces, using the digital camera with CMOS optical sensor. **Chapter 2, Principles and methods of modeling the optoelectronic systems of image control**, is a description of numerical methods modeling the imaging system. **Chapter 3, Principles and methods of optical resolution testing for optoelectronic systems with adaptive optics**, describes the calculation of the optical transfer function for a particular optical system. **Chapter 4 Theoretical and experimental contributions, to the development of optoelectronic imaging systems**, presents results regarding the development of spectral illumination methods when recording images. **Chapter 5 Contributions to the development of methods for testing optical resolution for imagistic systems with adaptive optics**; is the development of the calculation method of modulation transfer function. Theoretical aspects and experimental calculations of MTF function are described. The obtained results are a contribution to the use of the slanted-edge method for calculating the optical resolution for new optoelectronic devices with adaptive optics. Several original methods were developed in the presented work: use of optical band filters in combination with digital filters; methods of spectral illumination using LEDs; modeling of intensity profile of the light flux; method to remove glare and specularities from object surfaces using polarized light; development of the slanted edge method for testing optical resolution for an optoelectronic system with adaptive optics; computerized simulations of the slanted edge of different widths to improve the calculation algorithm.