

# Design of optical systems with diffraction elements on aspheric surfaces

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## **Abstract:**

The paper provides a method of obtaining the design parameters of the initial optical system schemes, including diffraction structures made on even aspherical surfaces of the most general form. The effectiveness of the technique is demonstrated by examples of calculation of design of the lens of a combined device for writing and reading of digital discs of two formats and a micro-lens of a video camera.

**Keywords:** optical system design, diffraction structures, aspherical surfaces.

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## **References:**

- [1] WayTech. Source: <http://waytech.co.kr>.
- [2] Rusinov MM. Composition of optical systems [In Russian]. Leningrad: "Mashinostroenie" Publisher; 1989.
- [3] Slusarev GG. Methods of calculating optical systems [In Russian]. Leningrad: "Mashinostroenie" Publisher; 1969.
- [4] Bezdidko SN. Some methods of determination of limit potential image quality of optical systems of various complexities, using database of optical systems [In Russian]. Proc VI Int Conf "Prikladnaya Optika-2004" (Saint-Petersburg) 2004; 3: 3-11.
- [5] Greisukh GI, Ezhov EG, Stepanov SA. Composition and design of high-resolution optical systems with gradient and diffraction elements [In Russian]. *Computer Optics* 2000; 20: 20-24.
- [6] Ezhov EG. Calculation of refractive-diffractive lenses of combined read/write devices for optical discs of several formats [In Russian]. Proc VII<sup>th</sup> International Conference "Prikladnaya Optika-2006" 2006; 3: 269-273.
- [7] Greisukh GI, Efimenko IM, Stepanov SA. Optics of gradient-index and diffractive elements [In Russian]. Moscow: "Radio i Svyaz" Publisher; 1990.
- [8] Greisukh GI, Bobrov ST, Stepanov SA. Optics of diffractive and gradient-index elements and systems. Bellingham: SPIE Press; 1997. ISBN: 978-0-8194-2451-8.
- [9] Zemax. Source: <http://www.zemax.com/zemax/index.html>.
- [10] Code V. Source: [http://www.opticalres.com/cv/cvprodds\\_f.html](http://www.opticalres.com/cv/cvprodds_f.html).
- [11] Greisukh GI, Ezhov EG, Stepanov SA. Calculation of the pseudo-beam path through optical systems, including diffractive lenses, whose structure is made on an aspherical surface [In Russian]. *Computer Optics* 2001; 21: 70-72.
- [12] Ezhov EG. Calculation and modeling of high-resolution gradient and diffraction-gradient lenses [In Russian]. The thesis for the Candidate's degree in Physics and Mathematics. Samara; 2001.
- [13] Greisukh GI, Ezhov EG, Stepanov SA. The comparative analysis of chromatism of the diffractive and refractive lenses [In Russian]. *Computer Optics* 2005; 28: 60-65.
- [14] Ezhov EG. Design of combined pick-up optical heads. *Appl Opt* 2006; 45(31): 8040-8043. DOI: 10.1364/AO.45.008040.
- [15] Greisukh GI, Ezhov EG, Stepanov SA. Diffractive-refractive hybrid corrector for achro- and apochromatic corrections of optical systems. *Appl Opt* 2006; 45(24): 6137-6141. DOI: 10.1364/AO.45.006137.
- [16] Ezhov EG, Greisukh GI, Stepanov SA. Design of combined optical read-write heads for digital disks of several formats [In Russian]. *Computer Optics* 2005; 27: 28-31.