Research on desensitization design method of optical systems

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Imaging optical design is a process of searching for the optimal solution within an extensive solution space, which encompasses all the variables required to describe an optical system. Most optical designs still focus on improving imaging performance, that is, the pursuit of achieving the optimal solution for aberration correction. A solution with the best "as-designed" performance is not necessarily the solution with the best "as-built" performance. Whether the optical system can be successfully manufactured and integrated, that is, sensitivity to errors, is a critical factor that determines the final realizability of high-performance optical systems. Therefore, reducing the sensitivity of the optical system is an important part of the optical system design process. In order to obtain an optical system with low sensitivity, we have proposed a series of innovative approaches, including the angle-optimized desensitization design method based on optical path difference variation and the local curvature control desensitization design method based on wavefront error variation. These research endeavors have led to the evolution of low sensitivity design theories and methods, shifting gradually from reflective systems to refractive systems, from conic to freeform surfaces. Based on our previous research and inspired by some excellent studies, we further analyze how to reduce the refractive index sensitivity of glass and how to use freeform surfaces to reduce the sensitivity of optical system. These methods have been applied in the design process of some optical cameras successfully.

Short Bio:

Qingyu Meng received his Eng.D degree in Optical Engineering from Harbin Institute of Technology, China. He is an associate professor of Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, China. He is mainly engaged in optical system design theory and design methods, as well as research on the design and development of space optical

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