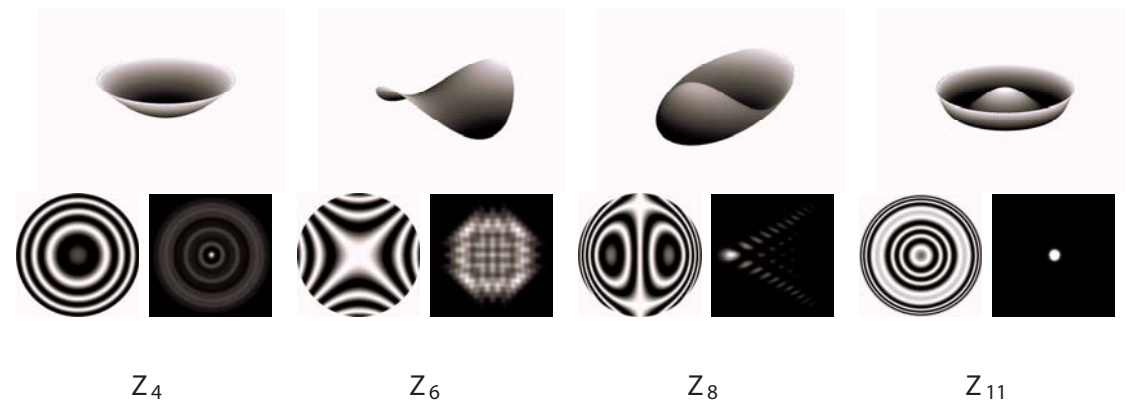
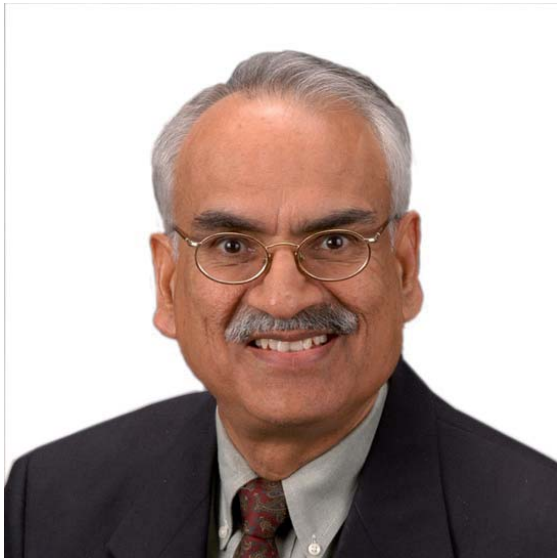


Zernike Polynomials and Beyond in Wavefront Analysis



Dr. Virendra N. Mahajan
Aerospace Corporation

PhD Optical Sciences, University of Arizona
Fellow OSA, SPIE, Optical Society of India
Author or editor of several well-known books.

This talk will describe why we use Zernike circle polynomials for wavefront analysis, and what polynomials should be used when the wavefront is not circular. Pitfalls of using the circle polynomials for noncircular wavefronts will also be discussed

3:00 pm, Monday, April 11, 2011
Sloan Auditorium, Goergen 101
Refreshments provided.

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Abstract

Zernike circle polynomials are in widespread use for wavefront analysis in both optical design and testing. Starting with their origin, we explain why we use them for analyzing circular wavefronts. We then discuss what to use when the wavefront is noncircular, e. g., annular, hexagonal, elliptical, rectangular, or square. We also discuss the pitfalls of using the Zernike circle polynomials for noncircular wavefronts, and illustrate the results by considering an annular Seidel aberration function. We end the talk with a brief discussion of the orthonormal polynomials for analyzing wavefronts of cylindrical optics, as opposed to rotationally symmetric.

Biography

Virendra N. Mahajan is a Distinguished Scientist at the Aerospace Corporation in the Los Angeles area, working on Missile Warning Satellites for the United States Air Force. He graduated from the College of Optical Sciences, University of Arizona, where he is an adjunct professor. He is also an adjunct professor at the Department of Optics and Photonics at the National Central University in Taiwan. He has taught full courses on optical aberrations not only at these universities but also at the Indian Institute of Technology, Delhi, the University of Central Florida, and the National Institute of Astrophysics, Optics and Electronics (INAOE) in Mexico. He has also taught short courses at the OSA and SPIE meetings. He is a frequently sought speaker under the Traveling/Visiting Lecturer Programs of OSA and SPIE.

Dr. Mahajan is a Fellow of OSA, SPIE, and the Optical Society of India. He is an associate editor of the Handbook of Optics. He was Topical Editor of Optics Letters in the areas of Optical Imaging and Diffraction from 2002 to 2005. He is the recipient of SPIE's 2006 Conrady award and Lifetime Achievement Award of the Optical Society of India.

Dr. Mahajan is well known for introducing Zernike annular polynomials for describing aberrations of systems with annular pupils. He is the author of Aberration Theory Made Simple (1991), editor of Effects of Aberrations in Optical Imaging (1993), author of Optical Imaging and Aberrations, Part I: Ray Geometrical Optics (1998), and Part II: Wave Diffraction Optics (2001), all published by SPIE.