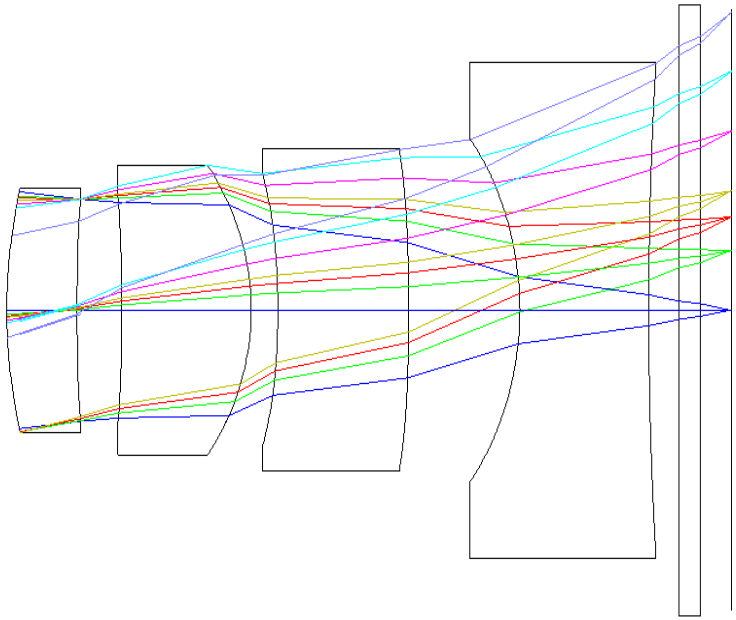
The Institute of OPTICS

Colloquium

UNIVERSITY OF ROCHESTER

Design and Performance of EDOF Digital Cameras



Prof. Nicholas George
Wilson Professor of Optical Imaging
The Institute of Optics, U. of Rochester
BS UC Berkeley, MS Maryland, PhD Caltech

3:00 pm Monday, February 20, 2012
Sloan Auditorium, Goergen 101
Refreshments served

We will review recent work in computer imaging to develop an integrated consideration of image acquisition and image processing leading to important new optical systems.

HAJIM
SCHOOL OF ENGINEERING
& APPLIED SCIENCES

DESIGN & PERFORMANCE OF EDOF DIGITAL CAMERAS

Nicholas George

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The Institute of Optics, University of Rochester

Abstract: In the field of computer imaging an integrated consideration of image acquisition and image processing is leading to important new optical systems. Illustrative of these novel systems is our highly successful effort to extend the depth of field of high quality digital camera systems by more than an order of magnitude. We describe this research and exploratory development at The Institute of Optics starting around 2001 and continuing into an extensive pre-production effort at a small local company GG & C that transitioned to Micron and Aptina in San Jose. We will describe new lens designs called “the logarithmic asphere,” “tailored EDOF,” and polarization or coherence decoupling. The lens-camera systems have been designed or characterized by their amplitude transmission function. Based on Fourier optics, the theory is rigorous and accurate in the non-paraxial regime so that a sophisticated lens designer can obtain finished lens designs. Several software systems have been employed in the digital processing of which the most generally useful is a maximum entropy package devised by Wanli Chi. Interesting rules of thumb will be covered in describing the design as time permits.

BIOGRAPHY: The speaker Nicholas George is the Joseph C. Wilson Professor of Electronic Imaging and Professor of Optics at The Institute of Optics, University of Rochester. He has 30 years of experience at the University of Rochester, and previously 20 years as a Professor of Applied Physics and Electrical Engineering at the California Institute of Technology. He obtained a BS degree at UC Berkeley, graduating with highest honors, the MS at Maryland, and the PhD from the California Institute of Technology. He has many firsts and near-firsts in the field of modern optics including the holographic diffraction grating, the holographic stereogram, the ring-wedge detector robotic vision system, the laser heterodyne for pollution sensing of nitrogen oxides, the infrared digital hologram, the theory and experiments for the wavelength dependence of speckle, the FM-FM laser line scan system for remote contouring of aerial maps, and the present research into EDOF for digital cameras. He has served as principal thesis advisor for more than 50 doctoral scholars.