Optical Imaging and Spectroscopy

Brady, David J. *Optical Imaging and Spectroscopy*. Hoboken, New Jersey: Wiley Publishers, 2009, 510 pp. $110.00 (Hardbound).

An Essential Reference for Optical Sensor System Design:

This is the first text to present an integrated view of the optical and mathematical analysis tools necessary to understand computational optical system design. It presents the foundations of computational optical sensor design with a focus entirely on digital imaging and spectroscopy. It systematically covers:

- Coded aperture and tomographic imaging
- Sampling and transformations in optical systems, including wavelets and generalized sampling techniques essential to digital system analysis
- Geometric, wave, and statistical models of optical fields
- The basic function of modern optical detectors and focal plane arrays
- Practical strategies for coherence measurement in imaging system design
- The sampling theory of digital imaging and spectroscopy for both conventional and emerging compressive and generalized measurement strategies
- Measurement code design
- Linear and nonlinear signal estimation

The book concludes with a review of numerous design strategies in spectroscopy and imaging and clearly outlines the benefits and limits of each approach, including coded aperture and imaging spectroscopy, resonant and filter-based systems, and integrated design strategies to improve image resolution, depth of field, and field of view.

Optical Imaging and Spectroscopy is an indispensable textbook for advanced undergraduate and graduate courses in optical sensor design. In addition to its direct applicability to optical system design, unique perspectives on computational sensor design presented in the text will be of interest for sensor designers in radio and millimeter wave, X-ray, and acoustic systems.

David J. Brady, PhD, received a BA in physics and mathematics from Macalester College and MS and PhD degrees in applied physics from California Institute of Technology. Dr. Brady is a Professor of Electrical and Computer Engineering in the Pratt School of Engineering at Duke University, where he directs the Duke Imaging and Spectroscopy Program. Dr. Brady is the architect of numerous computational imaging and spectroscopy systems, including multimodal multiplex spectroscopy and coded aperture snapshot spectral imaging. His current work focuses on multiple aperture lens system design and optical coherence measurement. He is a Fellow of the Optical Society of America, SPIE, and IEEE.