



# Optics: Learning by Computing, with Examples Using MathCad (Undergraduate Texts in Contemporary Physics)

*Karl Dieter Moeller*

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This book is intended for a one semester course in optics for juniors and seniors in science and engineering; it uses Mathcad(R) scripts to provide a simulated laboratory where students can learn by exploration and discovery instead of passive absorption.

The text covers all the standard topics of a traditional optics course, including: geometrical optics and aberration, interference and diffraction, coherence, Maxwell's equations, wave guides and propagating modes, blackbody radiation, atomic emission and lasers, optical properties of materials, Fourier transforms and FT spectroscopy, image formation, and holography. It contains step by step derivations of all basic formulas in geometrical, wave and Fourier optics.

The basic text is supplemented by over 170 Mathcad files, each suggesting programs to solve a particular problem, and each linked to a topic in or application of optics. The computer files are dynamic, allowing the reader to see instantly the effects of changing parameters in the equations. Students are thus encouraged to ask "what...if" questions to assess the physical implications of the formulas.

The book is written for the study of particular projects but can easily be adapted to a variation of related studies. The three-fold arrangement of text, applications, and files makes the book suitable for "self-learning" by scientists or engineers who would like to refresh their knowledge of optics. All files are printed out and are available on a CD and may well serve as starting points to find solutions to more complex problems as experienced by engineers in their applications.

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