Principles and Applications of Fourier Optics

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Preface

'All of optics is Fourier optics!' While this statement may not be literally true, when there is one basic mathematical tool to explain light propagation and image formation, with both coherent and incoherent light, as well as thousands of practical everyday applications of the fundamentals, Fourier optics is worth studying. This book contains five chapters with a summary of the principles of Fourier optics that have been developed over the past hundred years and two chapters with summaries of many applications over the past fifty years, especially since the invention of the laser. It is not necessary to take a new tack in explaining the principles. I have drawn liberally from the descriptions and notation of the authors of the classic texts on the topic, namely Professor Joseph V Goodman of Stanford University and Professor Jack D Gaskill of the University of Arizona. For applications that have evolved recently and are being reported even as this book goes to press, I have attempted to maintain the consistent notation and definitions of the early chapters, but deferred to the notation of the recent researchers where consulting the original papers with different notation would be confusing. This book is intended as a series of guideposts to improve our world through the applications of Fourier optics.

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Author biography

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Robert K Tyson is an associate professor emeritus at the University of North Carolina (UNC) at Charlotte. He has a bachelor's degree in physics from the Pennsylvania State University and MS and PhD degrees in physics from West Virginia University. Following his formal education, he worked in the aerospace industry for 20 years designing optical systems and supporting technology for strategic-defense high-energy laser weapon systems. He is the author of seven books on adaptive optics at various reading and interest levels. Dr Tyson joined the faculty of UNC Charlotte in 1999.