

# Preface

The deployment of high-order modulation formats in optical fiber transmission systems is presently seen as a promising way of increasing spectral efficiency and of making better use of the capacity of currently existing fiber infrastructure. Catering to this interest, this book presents possible ways of generating and detecting optical signals with high-order phase and quadrature amplitude modulation and characterizes their system and transmission properties.

Several implementation options for high-order modulation optical transmitters are possible. Their optical and electrical parts are described and their individual signal properties are discussed. Receiver concepts with direct detection, homodyne differential detection and homodyne synchronous detection are illustrated—starting with optical frontends and ending with electrical data recovery. The description of transmitters and receivers provided in the first part of the book does not only help to demonstrate their functioning, but also allows their complexity and practicability to be estimated and compared.

To advance understanding of the system and transmission behavior of high-order modulation formats for optical fiber transmission, various system parameters such as noise performances, optimal receiver filter bandwidths, required laser linewidths and the chromatic dispersion and self phase modulation tolerances of a wide range of modulation formats are highlighted in the second part of the book—considering different line codes and many transmitter and receiver configurations. Currently, the determination of attainable transmission distances for multi-span long-haul transmission using high-order modulation formats represents an exciting field of research. Recent results in this area are also covered by this book.

This monograph is intended for researchers in the field of optical communications, as well as for system designers who would like to learn about the properties and complexity of optical systems employing high-order modulation.

The author wishes to express his cordial thanks to his colleagues from the Fraunhofer Institute for Telecommunications, Heinrich-Hertz-Institut, and to Prof. Petermann for their technical assistance.

Berlin, January 2009

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<http://www.springer.com/978-3-540-93770-8>

High-Order Modulation for Optical Fiber Transmission

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2009, XXII, 252 p. 132 illus., 26 illus. in color., Hardcover

ISBN: 978-3-540-93770-8