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# Optical Solitons in Fibers

Third, Revised and Enlarged Edition  
With 91 Figures



Springer

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The first edition was published as Volume 116 of the series *Springer Tracts in Modern Physics*  
The second edition was published as a monograph

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ISSN 1437-0379

ISBN 978-3-642-07826-2      ISBN 978-3-540-46064-0 (eBook)  
DOI 10.1007/978-3-540-46064-0

Library of Congress Cataloging-in-Publication Data.

Hasegawa, Akira, 1934-. Optical solitons in fibers. – 3rd, rev. and enl. ed. / A. Hasegawa, M. Matsumoto.  
p. cm. – (Springer series in photonics, ISSN 1437-0379; 9). Includes bibliographical references and index.  
1. Solitons. 2. Optical fibers. I. Matsumoto, M. (Masayuki), 1960- II. Title. III.  
Springer series in photonics ; v. 9.    QC174.26.W28 H37 2002    530.12'4-dc21    2002030556

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© Springer-Verlag Berlin Heidelberg 1989, 1990, 2003

Originally published by Springer-Verlag Berlin Heidelberg New York in 2003

Softcover reprint of the hardcover 3rd edition 2003

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Data conversion: Frank Herweg, Leutershausen

Cover concept: eStudio Calamar Steinen

Cover production: *design & production* GmbH, Heidelberg

Printed on acid-free paper

# Preface

The optical soliton in fibers presents a beautiful example in which an abstract mathematical concept has produced a large impact on the real world of high technology field. Its existence was theoretically predicted in 1973 and experimentally demonstrated in 1980. However, attempts to implement solitons for ultra-high-speed communications have been a real challenge for many scientists who devoted their interests to this purpose. The challenge has been more fundamental and scientific than technical. For example, the solution of nonlinear Schrödinger equation having periodic variation of coefficients by means of the Lie transformation (to a homogeneous nonlinear Schrödinger equation) is by itself an interesting theoretical contribution. Timing jitter of solitons due to amplifier noise and its control and effects of polarization mode dispersion on soliton transmission are still some other examples. The discovery of the dispersion-managed soliton is an innovative contribution to the application of solitons to a real transmission system.

The research on optical solitons also produced a large impact on conventional optical-transmission technologies. The nonlinear Schrödinger equation model for lightwave envelope and the split-step method of the numerical solution are now widely used as standard techniques in general optical-transmission analyses. The concept of all-optical transmission, first introduced for optical soliton systems, is now used as standard in most recent transmission systems.

This book is the third edition published by Springer-Verlag under this title. The new edition contains many chapters that cover interesting developments that took place in the last decade, including soliton control, effects of polarization-mode dispersion, and in particular the dispersion-managed solitons.

Expenses for the preparation of the manuscript were covered by several fundings. One of the authors (M. Matsumoto) especially thanks International Communications Foundation for its support.

Kyoto, Osaka,  
June 2002

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