

J. Smoller

# Shock Waves and Reaction-Diffusion Equations

1983. 162 figures. Approx. 610 pages  
(Grundlehren der mathematischen Wissenschaften,  
Band 258)  
Cloth DM 128,-; approx. US \$ 51.20  
ISBN 3-540-90752-1

*Shock Waves and Reaction-Diffusion Equations* is a rigorous, self-contained introduction to the modern theory of partial differential equations. It is the first book to make easily available important parts of theory, including topological methods and the Conley index. While the first part of the book can be used as a text in partial differential equations, later parts lead the reader to the forefront of current research. Emphasis is not on the theory only, but also on many of the specific examples from a wide range of applications involving nonlinear wave motion processes and the equations of biomathematics and chemical reactions.

**Contents:** List of Frequency Used Symbols. - Introduction. - Basic Linear Theory: Ill-Posed Problems. Characteristics and Initial-Value Problems. The One-Dimensional Wave Equation. Uniqueness and Energy Integrals. Holmgren's Uniqueness Theorem. An Initial-Value Problem for a Hyperbolic Equation. Distribution Theory and Fundamental Solutions. Second-Order Linear Elliptic Equations. Second-Order Linear Parabolic Equations. - Reaction Diffusion Equations: Comparison Theorems and Monotonicity Methods. Linearization. Topological Methods. Bifurcation Theory. Systems of Reaction-Diffusion Equations. - The Theory of Shock Waves: Discontinuous Solutions of Conservation Laws. The Single Conservation Law. The Riemann Problem for Systems of Conservation Laws. Applications to Gas Dynamics. The Glimm Difference Scheme. Riemann Invariants, Entropy and Uniqueness. Quasi-Linear Parabolic Systems. - The Conley Index: The Conley Index. Index Pairs and the Continuation Theorem. Travelling Waves. - Bibliography. - Index.



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# Solitons

G. Eilenberger

## Solitons

Mathematical Methods for Physicists

1981. 31 figures. VIII, 192 pages  
(Springer Series in Solid-State Sciences, Volume 19)  
Cloth DM 56,-; approx. US \$ 23.40. ISBN 3-540-10223-X

This book was written in connection with a graduate-level course in theoretical physics. Main emphasis is placed on an introduction to inverse scattering theory as applied to one-dimensional systems exhibiting solitons, as well to the new mathematical concepts and methods developed for understanding them. Since the treatment is directed primarily at physicists, the mathematical background required is the same as that for courses in theoretical physics, namely an elementary knowledge of function theory, differential equations and operators in Hilbert space. This book offers readers interested in the application of soliton systems with a self-contained introduction to the subject, sparing them the necessity of tedious searches through original literature.

## Solitons

Editors: **R. Bullough, P. Caudrey**  
1980. 20 figures. XVIII, 389 pages  
(Topics in Current Physics, Volume 17)  
Cloth DM 76,-; approx. US \$ 44.90. ISBN 3-540-09962-X

## Solitons and Condensed Matter Physics

Proceedings of the Symposium on Nonlinear (Soliton) Structure and Dynamics in Condensed Matter, Oxford, England, June 27-29, 1978

Editors: **A. R. Bishop, T. Schneider**  
Revised 2nd printing. 1981. 120 figures. XI, 342 pages  
(Springer Series in Solid-State Sciences, Volume 8)  
Cloth DM 61,-; approx. US \$ 25.50. ISBN 3-540-09138-6



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