Instructions to Authors

Communications in Mathematical Physics

The instructions should be read carefully before preparing the manuscript.

A. General

Papers submitted for publication should preferably be written in **English.**

A **summary** for *Zentralblatt für Mathematik* should be attached. Manuscripts **(in duplicate)** must be in their final form and typed on one side of the paper only in double-line spacing with wide margins. The author should also keep a copy of the manuscript. An **abstract** must be included.
Normally, only printer's errors should be corrected in the proofs. A **charge** is made **for extensive changes** not due to typesetting errors, introduced at the proof stage.
Formulae should be typewritten whenever possible.

Special markings should be explained in a "Note to the printer" (see suggestions in section B). Copies produced by matrix printer are not accepted unless clearly legible.

Illustrations and diagrams should be submitted on separate sheets and not included in the text. They should either be good-quality glossy prints in the desired final size (inscriptions 2 mm high are recommended) or be drawn about twice the final size in India ink using clean uniform lines. In the latter case, letters and numbers should be about 4 mm high to allow for 50% reduction. The publisher reserves the right to reduce or enlarge illustrations and diagrams. The author should indicate in the margin of the manuscript where illustrations and diagrams are to be inserted.

Footnotes, other than those referring to the title of the paper, should be avoided. If absolutely necessary, they should be numbered consecutively and placed at the foot of the page on which they occur (not at the end of the article).
On the first page of the manuscript a short **running title** should be provided (not to exceed 70 typewriter strokes, including spaces).

The **list of references** at the end of the paper should always be in alphabetical order and include the names and initials of all authors (see examples below). Names of journals and book series should be abbreviated in accordance with *Zentralblatt für Mathematik*. Whenever possible, please replace all references to papers accepted for publication, preprints or technical reports by the exact name of the journal, as well as the volume, first and last page numbers and year, if the article has already been published or accepted for publication.
When styling the references, the following examples should be observed:

Journal article:

1. **or** [B–G] Tomboulis, E., Yaffe, L.: Finite temperature $SU(2)$ lattice gauge theory. Commun. Math. Phys. **100**, 313–341 (1985)

Complete book:

2. **or** [M] Bratelli, O., Robinson, D.W.: Operator algebras and quantum statistical mechanics, Vol II. Berlin, Heidelberg, New York: Springer 1981

Single contribution in a book:

3. **or** [G] Gromov, M.: Large Riemannian manifolds. In: Shiohama, K., Sakai, T., Sunada, T. (eds.) Curvature and topology of Riemannian manifolds. Proceedings, Katata 1985. Lecture Notes Mathematics, Vol. 1201, pp. 108–121. Berlin, Heidelberg, New York: Springer 1986

Citations in the text should be either **(a)** by numbers in square brackets, e. g., [1], or Bombieri and Giusti [1], referring to an alphabetically ordered and numbered list, or **(b)** by the author's initials in square brackets, e. g., [B–G], or **(c)** by author and year in parentheses, e. g., Bombieri and Giusti (1971). Any one of these styles is acceptable if used *consistently* throughout the paper. In the third system, if there are two authors, both should be named, e. g., Agar and Douglas (1955); if a work with more than two authors is cited, only the first author's name plus "et al." need be given; e. g., Komor et al. (1979); if there is more than one reference by the same author or team of authors in the same year, then a, b, c, etc. should be added after the year both in the text and in the list of references.
One hundred (100) **offprints** of each paper will be supplied free of charge. Additional offprints are available in lots of 100, provided the order form is received with the corrected proof.

B. Color coding

Manuscripts must be marked according to the following rules unless produced on a golfball/daisy typewriter or on a good-quality printer and the desired fonts (Greek, script, special roman, boldface, etc.) are clearly recognizable. Special letters or symbols should be explained in a "Note to the printer". Unmarked manuscripts may have to be returned to the authors, which may cause a delay in publication.

1. Text

Manuscripts produced by computer typesetting with a daisy wheel or laser printer, or by manual typing with special fonts require marking only of special symbols, and distinguishing between 0 and O, 0 and o, and 1 and l. Special letters or symbols should be explained in a "Note to the Printer." In other cases the following instructions should be followed.

The words **"Theorem", "Lemma", "Corollary", "Proposition"** etc. are normally printed in **boldface,** followed by the formulation in *italics* (to be underlined in the manuscript), the end of which should be clearly indicated. The words "*Proof*", "*Remark*", "*Example*", "*Note*" etc. are printed in *italics* with the formulation in ordinary (roman) typeface, and **Definition** in boldface. The text of the definition itself should be in roman except for the concept defined, which should be in *italics*. Words or sentences to be set in italics should be marked by single underlining. If the material underlined in the manuscript is to be typeset with underlining (and not set in italics), this must be explained to the printer.

2. Formulae

Letters in formulae are printed in *italics* and figures in roman, if not marked otherwise. It will help the printer if in doubtful cases the position of indices and exponents is marked thus: $h_{\beta\lambda}$, $a^{\forall}$. Spacing of indices and exponents must be specially indicated ($A_{m\ n}^{\ n\ m}$) otherwise they will be set (A_{mn}^{nm}).

Underlining for special alphabets and typefaces should be done according to the following code:

Violet:	Letters in formulae (l, O, o) to be distinguished from numerals (1, 0)
Brown:	boldface (headings, boldface letters in formulae)
Yellow:	roman (abbreviations e. g. Re, Im, log, sin, ord, id, lim, sup, etc.)
Red:	Greek
Green:	script
Orange:	special roman
Blue:	Gothic
Encircled:	sanserif

The following are frequently confused and should be made unambiguous:

$\cup, \cup, \bigcup, U;\ \circ, o, O, 0;\ \times, x, X, \chi, \kappa;\ \vee, v, \nu;$
$\theta, \Theta, \phi, \varphi, \Phi, \varnothing, \emptyset;\ \psi, \Psi;\ \varepsilon, \in;$
a', a^1; the symbol *a* and the indefinite article a;

also the handwritten letters:

c, C; e, l; I, J; k, K; o, O; p, P; s, S; u, U; v, V; w, W; x, X; z, Z

Please take care to distinguish these capital letters by double underlining.

C. Examples

1. Special alphabets or typefaces

Boldface **A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z**

Greek $\Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega$
$\alpha, \beta, \gamma, \delta, \varepsilon, \zeta, \eta, \theta, \vartheta, \iota, \kappa, \lambda, \mu, \nu, \xi, o, \pi, \varrho, \sigma, \tau, \upsilon, \varphi, \phi, \chi, \psi, \omega$

Script $\mathcal{A}, \mathcal{B}, \mathcal{C}, \mathcal{D}, \mathcal{E}, \mathcal{F}, \mathcal{G}, \mathcal{H}, \mathcal{I}, \mathcal{J}, \mathcal{K}, \mathcal{L}, \mathcal{M}, \mathcal{N}, \mathcal{O}, \mathcal{P}, \mathcal{Q}, \mathcal{R}, \mathcal{S}, \mathcal{T}, \mathcal{U}, \mathcal{V}, \mathcal{W}, \mathcal{X}, \mathcal{Y}, \mathcal{Z}$
$a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z$

Special roman $\mathbb{A}, \mathbb{B}, \mathbb{C}, \mathbb{D}, \mathbb{E}, \mathbb{F}, \mathbb{G}, \mathbb{H}, \mathbb{I}, \mathbb{J}, \mathbb{K}, \mathbb{L}, \mathbb{M}, \mathbb{N}, \mathbb{O}, \mathbb{P}, \mathbb{Q}, \mathbb{R}, \mathbb{S}, \mathbb{T}, \mathbb{U}, \mathbb{V}, \mathbb{W}, \mathbb{X}, \mathbb{Y}, \mathbb{Z}, \mathbb{1}$

Gothic $\mathfrak{A}, \mathfrak{B}, \mathfrak{C}, \mathfrak{D}, \mathfrak{E}, \mathfrak{F}, \mathfrak{G}, \mathfrak{H}, \mathfrak{I}, \mathfrak{J}, \mathfrak{K}, \mathfrak{L}, \mathfrak{M}, \mathfrak{N}, \mathfrak{O}, \mathfrak{P}, \mathfrak{Q}, \mathfrak{R}, \mathfrak{S}, \mathfrak{T}, \mathfrak{U}, \mathfrak{V}, \mathfrak{W}, \mathfrak{X}, \mathfrak{Y}, \mathfrak{Z}$
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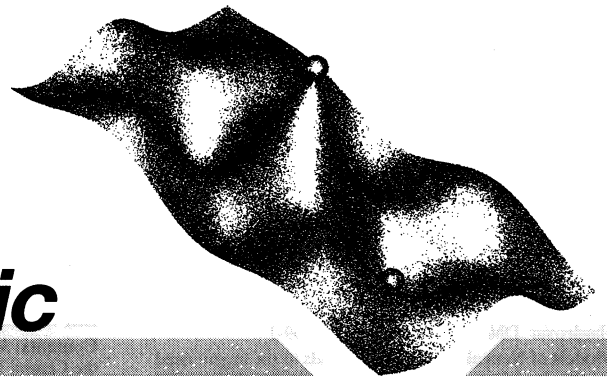
Sanserif A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z
a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z

Final check:

- All formula characters unambiguous?
- Information on title page complete (title, name(s) of author(s), institute(s), complete address(es))?
- All figures enclosed?
- References complete and cross-checked?
- Text and end of theorems, lemmas etc. marked?
- Short running title given?
- Summary for *Zentralblatt für Mathematik* enclosed?

H. Haken,

University of Stuttgart

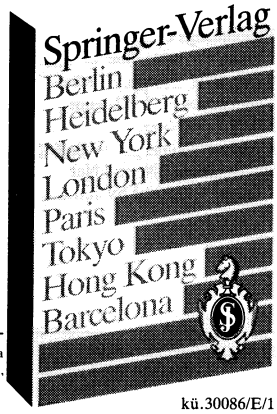


Synergetic Computers and Cognition

A Top-Down Approach to Neural Nets

1991. 240 pp. 163 figs.
(Springer Series in Synergetics, Vol. 50)
Hardcover DM 98,– ISBN 3-540-53030-4

This book presents a novel approach to neural nets and thus offers a genuine alternative to the hitherto known neuro-computers. This approach is based on the author's discovery of the profound analogy between pattern recognition and pattern formation in open systems far from equilibrium. Thus the mathematical and conceptual tools of synergetics can be exploited, and the concept of the synergetic computer formulated. A complete and rigorous theory of pattern recognition and learning is presented. The resulting algorithm can be implemented on serial computers or realized by fully parallel nets whereby no spurious states occur. Explicit examples (recognition of faces and city maps) are provided. The recognition process is made invariant with respect to simultaneous translation, rotation, and scaling, and allows the recognition of complex scenes. Oscillations and hysteresis in the perception of ambiguous patterns are treated, as well as the recognition of movement patterns. A comparison between the recognition abilities of humans and the synergetic computer sheds new light on possible models of mental processes. The synergetic computer can also perform logical steps such as the XOR operation.



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Neural Nets

E. Domany, Oxford; **L. van Hemmen,** München; **K. Schulten,** Urbana, IL (Eds.)

Models of Neural Networks

With contributions by numerous experts
1990. XVI, 345 pp. 78 figs. (Physics of Neural Networks) Hardcover DM 78,– ISBN 3-540-51109-1

Models of Neural Networks responds to the urgent need for timely and comprehensive reviews in a multidisciplinary, rapidly moving field of research. The book starts out with an extensive introduction to the notions used in the subsequent chapters, which are all centered around the theme of collective phenomena in neural networks: dynamics and storage capacity of networks of formal neurons with symmetric or asymmetric couplings, learning algorithms, temporal association, structured data (software), and structural nets (hardware).
Both style and level make this book most useful for advanced students and researchers looking for an accessible survey of today's theory of neural networks.

T. Kohonen, Helsinki

Self-Organization and Associative Memory

3rd ed. 1989. XV, 312 pp. 100 figs. (Springer Series in Information Sciences, Vol. 8) Softcover DM 68,– ISBN 3-540-51387-6

Contents: Various Aspects of Memory. - Pattern Mathematics. - Classical Learning Systems. - A New Approach to Adaptive Filters. - Self-Organizing Feature Maps. - Optimal Associative Mappings. - Pattern Recognition. - More About Biological Memory. - Notes on Neural Computing. - Optical Associative Memories. - Bibliography on Pattern Recognition. - References. - Subject Index.

H. Haken, Stuttgart (Ed.)

Neural and Synergetic Computers

Proceedings of the International Symposium at Schloss Elmau, Bavaria, June 13-17, 1988
1988, VIII, 263 pp. 139 figs. (Springer Series in Synergetics, Vol. 42) Hardcover DM 88,– ISBN 3-540-50339-0

Contents: Synergetics, Self-Organization, Pattern Recognition. - Neural Networks. - Perception and Motor Control. - Optical Systems. - Index of Contributors.

B. Müller, Durham, NC; **J. Reinhardt,** Frankfurt

Neural Networks

1990. XIII, 266 pp. 83 figs. (including a 5 1/4-inch MS DOS diskette) (Physics of Neural Networks) Hardcover DM 78,–ISBN 3-540-52380-4

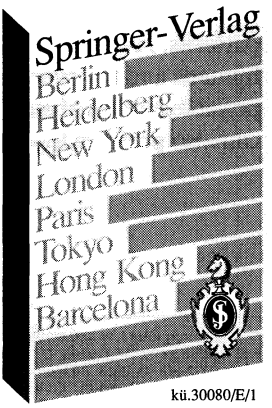
Contents: *Models of Neural Networks:* The Structure of the Central Nervous System. - Neural Networks Introduced. - Associative Memory. - Stochastic Neurons. - Cybernetic Networks. - Multilayered Perceptrons. - Applications. - Network Architecture and Generalization. - Associative Memory: Advanced Learning Strategies. - Combinatorial Optimization. - VLSI and Neural Networks. - Symmetrical Networks with Hidden Neurons. - Coupled Neural Networks. - Unsupervised Learning. - *Statistical Physics of Neural Networks:* Statistical Physics and Spin Glasses. - The Hopfield Network for p/N-O. - The Hopfield Network for Finite p/N. - The Space of Interactions in Neural Networks. - *Computer Codes:* Numerical Demonstrations. - ASSO: Associative Memory. - ASSCOUNT: Associative Memory for Time Sequences. - PERBOOL: Learning Boolean Functions with Back-Propagation. - PERFUNC: Learning Continous Functions with Back-Propagation. - Solution of the Traveling-Salesman Problem. - KOHOMAP: The Kohonen Self-organizing Map. - References. - Subject Index.

H. Atlan, Jerusalem; **I. R. Cohen,** Rehovot (Eds.)

Theories of Immune Networks

1989. VIII, 117 pp. 23 figs. (Springer Series in Synergetics, Vol. 46) Hardcover DM 85,– ISBN 3-540-51678-6

Theories of Immune Networks presents various techniques to model the immune system as a network of interacting units (cell and molecule populations). Their respective significance is discussed on the basis of available empirical data (idiotypic-antiidiotypic interactions, receptor-antigen reactions and cross-reactivity) and of the simulation properties exhibited by the models (stability, memory, learning). Neural networks computation techniques, recently developed in cognitive sciences, are introduced into the field of immunology for the first time.



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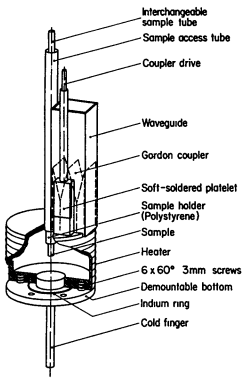
K. A. Müller, University of Zürich;
H. Thomas, University of Basel (Eds.)

Structural Phase Transitions II



With two contributions by K. A. Müller, J. C. Fayet, F. Borsa, A. Rigamonti

1991. IX, 183 pp. 50 figs. 47 panels. (Topics in Current Physics, Vol. 45) Hardcover DM 68,- ISBN 3-540-52238-7

Structural Phase Transitions II, like its predecessor (Topics in Current Physics, Vol. 23), presents selected methods and recent advances in the experimental investigation of phase transitions in solids. The two chapters in this volume deal with electron paramagnetic resonance (EPR), and with nuclear magnetic and nuclear quadrupole resonance (NMR-NQR). Both techniques are particularly sensitive to local properties. The chapter on EPR concentrates largely on the investigation of static properties, including mean-field behaviour, critical and multicritical phenomena, whilst NMR is shown to be a powerful tool for studying nonlinear dynamics, incommensurate transitions, and disordered systems.
This book will serve as an excellent introduction to the methodology and applications of EPR and NMR-NQR for all those wishing to become acquainted with these important tools for studying structural phase transitions.

Also available:

K. A. Müller, H. Thomas, **Structural Phase Transitions I.** (Topics in Current Physics, Vol. 23). 1981. ISBN 3-540-10329-5

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D.W. Heermann

Computer Simulation Methods

in Theoretical Physics

2nd ed. 1990. XI, 145 pp. 30 figs. Softcover DM 39,- ISBN 3-540-52210-7

Computational methods pertaining to many branches of science, such as physics, physical chemistry and biology, are presented. The text is primarily intended for third-year undergraduate or first-year graduate students. However, active researchers wanting to learn about the new techniques of computational science should also benefit from reading the book. It treats all major methods, including the powerful molecular dynamics method, Brownian dynamics and the Monte-Carlo method. All methods are treated equally from a theoretical point of view. In each case the underlying theory is presented and then practical algorithms are displayed, giving the reader the opportunity to apply these methods directly. For this purpose exercises are included. The book also features complete program listings ready for application.

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Textbooks from Springer-Verlag

H. Ibach, H. Lüth,
KFA Jülich und RWTH Aachen

Solid-State Physics

An Introduction to Theory and Experiment

Translated from the German by
A. Lahee, K. Prince

1991. Approx. 360 pp. 230 figs. 16 tabs.
Hardcover DM 74,– ISBN 3-540-52207-7

Contents: Chemical Bonding in Solids.– Crystal Structures.– Diffraction from Periodic Structures.– Crystal Lattice Dynamics.– Thermal Properties of Crystal Lattices.– "Free" Electrons in Solids.– Electronic Bandstructure of Solids.– Magnetism.– Motion of Electrons and Transport Phenomena.– Superconductivity.– The Dielectric Properties of Materials.– Semiconductors.– References.– Index.– Periodic Table of the Elements.– Table of Constants and Equivalent Values.

Deutsche Ausgabe:
H. Ibach, H. Lüth, **Festkörperphysik.**
«Springer-Lehrbuch». 3. Aufl. 1990.
DM 59,– ISBN 3-540-52193-3

W. Brenig, TU Munich

Statistical Theory of Heat

Nonequilibrium Phenomena

1989. XI, 290 pp. 39 figs.
Hardcover DM 54,– ISBN 3-540-51036-2

Statistical Theory of Heat provides an integrated presentation of nonequilibrium statistical physics based on the methods of correlation functions and memory kernels. The relation between this approach and other, earlier methods is discussed in detail. Topics covered include: ● classical results of kinetic and transport theories ● hydrodynamic long time tails ● dynamical scaling laws for critical phenomena ● electron localization in random potentials ● a general microscopic nonlinear response theory ● chemical reactions ● nonlinear phenomenological theories ● chaos

D.W. Heermann, University of Heidelberg

Computer Simulation Methods

in Theoretical Physics

2nd ed. 1990. XI, 145 pp. 30 figs. Softcover DM 39,–
ISBN 3-540-52210-7

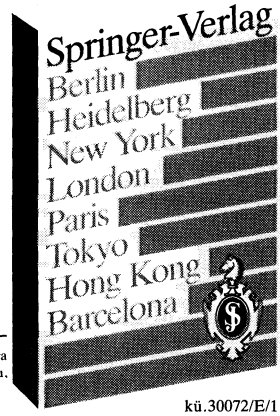
Contents: Introductory Examples.– Computer-Simulation Methods.– Deterministic Methods.– Stochastic Methods.– Appendices.– References.– Subject Index.

P. Meystre, M. Sargent III, University of Arizona Tucson, AZ

Elements of Quantum Optics

1990. XIV, 484 pp. 113 figs. Hardcover DM 69,–
ISBN 3-540-52160-7

Contents: Classical Electromagnetic Fields.– Classical Nonlinear Optics.– Quantum Mechanical Background.– Mixtures and the Density Operator.– CW Field Interactions.– Introduction to Laser Theory.– Optical Bistability.– Saturation Spectroscopy.– Three and Four Wave Mixing.– Time-Varying Phenomena in Cavities.– Coherent Transients.– Field Quantization.– Interaction Between Atoms and Quantized Fields.– Systems-Reservoir Interactions.– Resonance Fluorescence.– Squeezed States of Light.– Quantum Theory of a Laser.– Subject Index.



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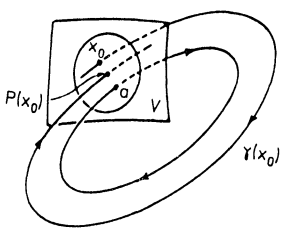
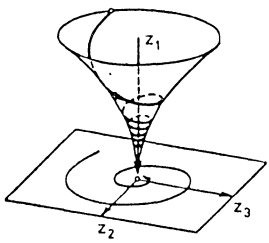
L. Perko, Northern Arizona University, Flagstaff, AZ

Differential Equations and Dynamical Systems

1991. XII, 403 pp. 177 figs. (Texts in Applied Mathematics, Vol. 7) Hardcover DM 78,-
ISBN 3-540-97443-1

The main purpose of the book is to introduce students to the qualitative and geometric theory of ordinary differential equations originated by Henri Poincaré at the end of the 19th century. It is also intended as a reference book for mathematicians doing research on dynamical systems.
There are several new features in this book such as the simplified proof of the Hartman-Grobman Theorem and examples illustrating the proof, map in the theory of limit cycles, an efficient method for obtaining the global phase portrait of two-dimensional systems, and the description of the behavior of a one-parameter family of limit cycles. The authors show the global qualitative theory of a nonlinear dynamical system leads to an understanding of the solution set of the nonlinear system that rivals the understanding that we have of linear flows.





Contents: Preface. - Linear Systems. - Nonlinear Systems: Local Theory. - Nonlinear Systems: Global Theory. - Nonlinear Systems: Bifurcation Theory. - Bibliography. - Index.

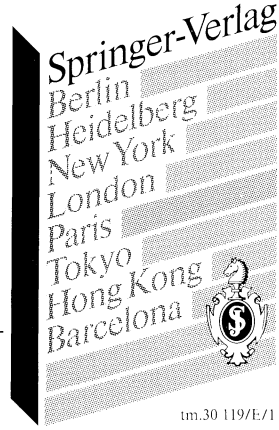
F. Verhulst, State University of Utrecht

Nonlinear Differential Equations and Dynamical Systems

1990. IX, 227 pp. 107 figs. 2 tabs. (Universitext) Softcover DM 38,- ISBN 3-540-50628-4

This text bridges the gap between elementary courses on differential equations and the research literature. Subject material from both the qualitative and the quantitative point of view is presented. Many examples illustrate the theory and the reader should be able to start doing research after studying this book.

Contents: Introduction. - Autonomous equations. - Critical points. - Periodic solutions. - Introduction to the theory of stability. - Linear equations. - Stability by linearisation. - Stability analysis by direct method. - Introduction to pertubation theory. - The Poincaré-Lindstedt method. - The method of averaging. - Relaxation oscillations. - Bifurcation theory. - Chaos. - Hamiltonian systems. - Appendices. - Answers and hints to the exercises. - References. - Index.



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