

## Analysis I (Graduate Series in Analysis)

### Description

Analysis I is part one of the undergraduate series in analysis. This book is based on the courses given by the author at Heidelberg. It comprises of materials for a one and a half semester, and can be used as a textbook. The contents range from elementary calculus to fairly advanced topics in functional analysis, measure theory and differential geometry.

The book covers "The convergence of sequences, topological concepts including continuity, compactness and connectedness, Resp. differentiation in one variable, theorems of Arzela-Ascoli and Stone-Weierstraß and analytic functions in several variables, as well as Riemann integral.

This book, which demands minimum prerequisites, is intended for first year graduate students or undergraduates who want to pursue the Math or Physics fields.

Released in Feb, 2004

Author: Claus Gerhardt  
 ISBN:1-57146-153-1  
 Year Published: 2004  
 Page: 250 pp  
 Binding: Softcover  
 Price: \$50  
 (final details subject to change upon release)

### Table of Content

1. Foundations (Elements of Logic, Elements of set theory, Cartesian Product, Functions and Relations, Natural and Real Numbers)
2. Convergence (Convergence in  $\mathbb{R}$ , Infinite series in  $\mathbb{R}$ , Convergence in  $\mathbb{R}^n$ , Metric spaces, Series in Banach spaces, Uniform convergence, Complex numbers)
3. Continuity (Topological concepts, Continuous maps, Compactness, The Tietze-Urysohn extension theorem, Connectedness, Product spaces, Continuous linear maps, Semicontinuous functions)
4. Differentiation in one Variable (Differentiable functions, The mean value theorem and its consequences, De L'Hospital's Rule, Differentiation of sequences of functions, The differential equation  $\dot{x} = Ax$ , The elementary functions, Polynomials, Taylor's formula)
5. Spaces of continuous functions (Dini's theorem, Arzela-Ascoli Theorem, The Stone-Weierstraß Theorem, Analytic functions)
6. Integration in one variable (The Riemann integral, Integration rules, Monotone and continuous functions are integrable, Fundamental theorem of calculus, Integral theorems and transformation rules, Integration of rational functions, Lebesgue's integrability criterion, Improper integrals, Parameter dependent integrals)

## Chaos in Partial Differential Equations

### Description

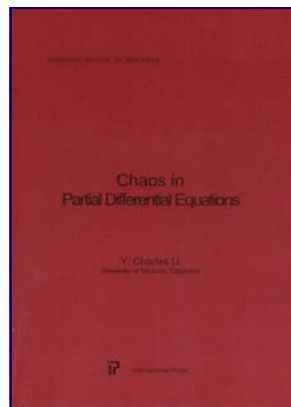
Chaos in Partial Differential Equations is at its fast developing stage. The present book presents an overall survey on the existing results from the recent development.

Nonlinear wave equations are the most important class of partial differential equations in natural sciences. Among these nonlinear wave equations, there is a class of equations called soliton equations which describes a wide spectrum of natural phenomenon. Recently, the author and his collaborators have established a systematic theory on chaos in nonlinear wave equations: a standard program for proving the existence of chaos in perturbed soliton equations, with the machineries: 1. Darboux transformations for soliton equations, 2. isospectral theory for soliton equations under periodic boundary condition, 3. persistence of invariant manifolds and Fenichel fibers, 4. Melnikov analysis, 5. Smale horseshoes and symbolic dynamics, and 6. shadowing lemma and symbolic dynamics.

This monograph will be of interest to researchers in mathematics, physics, engineering, chemistry, biology and science in general, and particularly valuable to researchers interested in chaos in high dimensions. The book can be used as a textbook for advanced graduate courses, while the author tries to make the presentations introductory such that beginners can also benefit from it.

Released in Feb, 2004

Author: Y. Charles Li  
 ISBN:1-57146-151-5  
 Year Published: 2004  
 Page: 129 pp  
 Binding: Softcover  
 Price: \$48  
 (final details subject to change upon release)



### Table of Content

- General Setup and Concepts  
 Soliton Equations as Integrable Hamiltonian PDEs  
 Figure-Eight Structures  
 Melnikov Vectors  
 Invariant Manifolds  
 Homoclinic Orbits  
 Existence of Chaos  
 Stabilities of Soliton Equations in  $\mathbb{R}^n$   
 Lax Pairs of Euler Equations of Inviscid Fluids  
 Linearized 2D Euler Equation at a Fixed Point  
 Arnold's Liapunov Stability Theory  
 Miscellaneous Topics