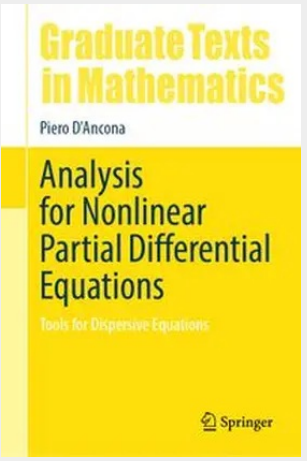
D'Ancona

Analysis for Nonlinear Partial Differential Equations

Tools for Dispersive Equations



This book offers a rigorous and self-contained introduction to the analytical methods used in nonlinear partial differential equations, with a special emphasis on dispersive equations. The book addresses a central difficulty of the field: the prerequisite tools required for applying modern PDE theory are often scattered across different sources, either developed with incompatible notation or presented without considering dispersive analysis. In this book, they are organized into a coherent framework, offering rigorous, self-contained proofs and a unified point of view. Readers are guided from foundational topics such as Lebesgue and Lorentz spaces, convolution, weak convergence, and Fourier transforms to more advanced techniques including oscillatory integrals, maximal functions, singular integrals, dyadic methods, and spaces of regular functions. These foundational techniques can help readers in studying regularity, decay, dispersive estimates, and the behavior of solutions to evolution equations. The final part of the book shows how this analytical toolbox is applied to the Schrödinger and wave equations, highlighting the core ideas of Euclidean dispersive analysis in a concrete and mathematically rigorous way. By combining breadth, detail, and an explicit focus on applications, the book serves both as a reference work and as a pathway into a demanding area of research. It is intended for graduate students and early career researchers in analysis, partial differential equations, harmonic analysis, and mathematical physics.

This book offers a rigorous and self-contained introduction to the analytical methods used in nonlinear partial differential equations, with a special emphasis on dispersive equations. The book addresses a central difficulty of the field: the prerequisite tools required for applying modern PDE theory are often scattered across different sources, either developed with incompatible notation or presented without considering dispersive analysis. In this book, they are organized into a coherent framework, offering rigorous, self-contained proofs and a unified point of view. Readers are guided from foundational topics such as Lebesgue and Lorentz spaces, convolution, weak convergence, and Fourier transforms to more advanced techniques including oscillatory integrals, maximal functions, singular integrals, dyadic methods, and spaces of regular functions. These foundational techniques can help readers in studying regularity, decay, dispersive estimates, and the behavior of solutions to evolution equations. The final part of the book shows how this analytical toolbox is applied to the Schrödinger and wave equations, highlighting the core ideas of Euclidean dispersive analysis in a concrete and mathematically rigorous way. By combining breadth, detail, and an explicit focus on applications, the book serves both as a reference work and as a pathway into a demanding area of research. It is intended for graduate students and early career researchers in analysis, partial differential equations, harmonic analysis, and mathematical physics.

96,29 €
89,99 € (zzgl. MwSt.)

vorbestellbar, Erscheinungstermin ca. Februar 2027

Artikelnummer: 9783032452245
Medium: Buch
ISBN: 978-3-032-45224-5
Verlag: Springer
Erscheinungstermin: 24.02.2027
Sprache(n): Englisch
Auflage: Erscheinungsjahr 2027
Serie: Graduate Texts in Mathematics
Produktform: Gebunden
Seiten: 1111
Format (B x H): 155 x 235 mm

Kundenservice Verlag Dr. Otto Schmidt KG
Neumannstraße 10, 40235 Düsseldorf | kundenservice@otto-schmidt.de | 0221-93738-997 (Inland)