Partial Differential Equations: An Introduction to Theory and Applications

By Michael Shearer, Rachel Levy

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This textbook provides beginning graduate students and advanced undergraduates with an accessible introduction to the rich subject of partial differential equations (PDEs). It presents a rigorous and clear explanation of the more elementary theoretical aspects of PDEs, while also drawing connections to deeper analysis and applications. The book serves as a needed bridge between basic undergraduate texts and more advanced books that require a significant background in functional analysis.

Topics include first order equations and the method of characteristics, second order linear equations, wave and heat equations, Laplace and Poisson equations, and separation of variables. The book also covers fundamental solutions, Green's functions and distributions, beginning functional analysis applied to elliptic PDEs, traveling wave solutions of selected parabolic PDEs, and scalar conservation laws and systems of hyperbolic PDEs.

- Provides an accessible yet rigorous introduction to partial differential equations
- Draws connections to advanced topics in analysis
- Covers applications to continuum mechanics
- An electronic solutions manual is available only to professors
- An online illustration package is available to professors

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Partial Differential Equations: An Introduction to Theory and Applications By Michael Shearer, Rachel Levy Bibliography

- Sales Rank: #1325632 in Books
- Brand: imusti
- Published on: 2015-03-01
- Original language: English
- Number of items: 1
- Dimensions: 10.00" h x .80" w x 7.30" l, .0 pounds
- Binding: Hardcover
- 288 pages

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Editorial Review

Review
"This book is unique in that it provides a very comprehensive introduction to the theory of PDEs embedded in specific relevant applications in the field."**--*Choice***

"The authors provide not only a clear and rigorous explanation of the more elementary theoretical aspects of partial differential equations, but they are also concerned with tools of applied mathematics in the setting of partial differential equations. . . . This reviewer warmly recommends this volume to mathematical university libraries."**--Vicentiu D. Radulescu,** *Zentralblatt MATH*

From the Back Cover

"The writing style of this book is accessible, clear, and student friendly. It is approachable, with plenty of motivation for new students, and integrates nonlinear PDEs throughout. Shearer and Levy are familiar with contemporary research in applied PDEs and have made an excellent selection of topics to introduce the field."**--John K. Hunter, University of California, Davis**

"The material is presented in a new and innovative way, stressing more modern ideas in PDEs while keeping the approach accessible. Superior illustrations accompany important concepts, and the anecdotes and examples throughout the book will keep students interested. Shearer and Levy are both highly regarded researchers and educators in the field."**--David Uminsky, University of San Francisco**

About the Author
Michael Shearer is professor of mathematics at North Carolina State University. He is a fellow of the American Mathematical Society. **Rachel Levy** is associate professor of mathematics at Harvey Mudd College. She is a recipient of the 2013 Henry L. Alder Award for Distinguished Teaching by a Beginning College or University Mathematics Faculty Member and creator of the Grandma Got STEM project.

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