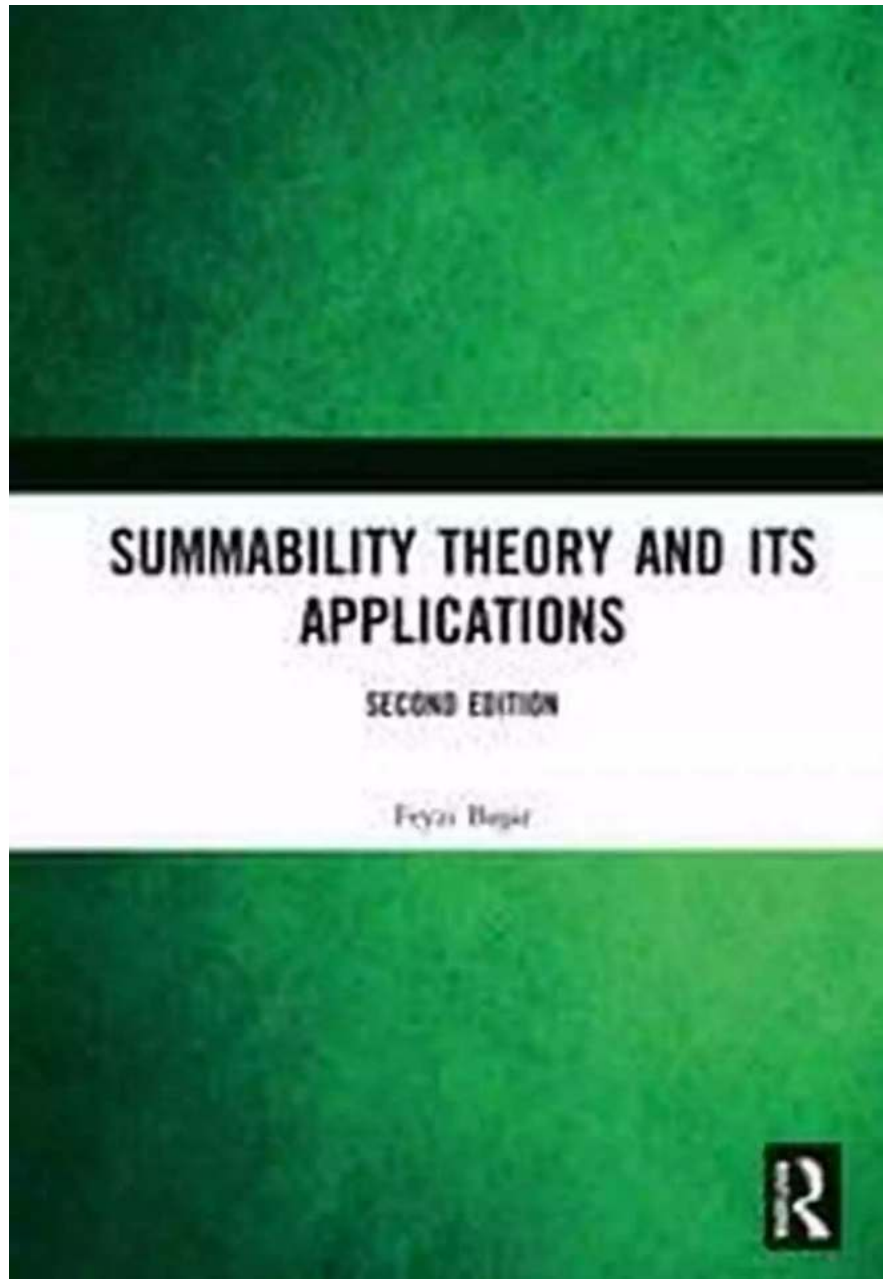


An Introductory Course In Summability Theory: Unveiling the Mysteries of Infinite Series

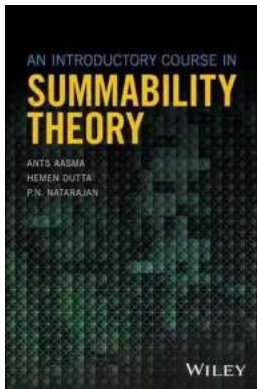


Summability theory, a branch of mathematical analysis, explores the principles and methods of assigning a finite value to a divergent series. It provides a

systematic framework for studying the behavior and convergence of infinite series, offering insightful tools to address challenges posed by these seemingly paradoxical mathematical objects.

Why Study Summability Theory?

Imagine you encounter an infinite series like $1 - 1 + 1 - 1 + 1 - 1 + \dots$ and need to assign a value to it. Intuitively, this series does not appear to have a fixed sum, as it alternatively adds and subtracts one. However, summability theory equips us with techniques to assign finite values to such series by "summing" them in a different way.



An Introductory Course in Summability Theory

by Temitope James(1st Edition, Kindle Edition)

★★★★★ 5 out of 5

Language	: English
File size	: 15069 KB
Text-to-Speech	: Enabled
Screen Reader	: Supported
Enhanced typesetting	: Enabled
Lending	: Enabled
Print length	: 200 pages



The applications of summability theory extend beyond mathematics. It finds utility in physics, engineering, signal processing, and other scientific fields. By delving into this field, not only will you enhance your mathematical problem-solving skills, but you will also gain a deeper understanding of the intricacies of infinite series and their applications in various domains.

Topics Covered in an Introductory Course

An introductory course in summability theory will guide students through a structured curriculum, gradually building their knowledge and expertise in the subject matter. Some of the key topics covered in such a course include:

1. Basic concepts of infinite series
2. Convergence and divergence of series
3. Methods of classical summation
4. Cesàro summability
5. Abel summability
6. Borel summability
7. Modern summability methods
8. Applications of summability theory

Exploring Summation Methods

One of the fundamental aspects covered in this course is the examination of various summation methods. These methods allow us to assign finite values to divergent series by manipulating their partial sums.

Classic methods such as Cesàro summability and Abel summability employ ingenious techniques to assign finite values to series that don't converge in the traditional sense. These methods involve taking average values or applying certain transformations to the partial sums of the series.

Additionally, we delve into more advanced methods like Borel summability and modern summability methods based on functional analysis. These methods extend the applications of summability theory to areas such as quantum field theory and complex analysis.

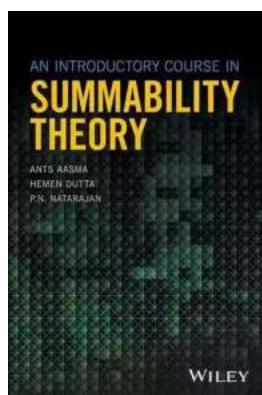
Applications in Real-World Problems

Summability theory finds practical applications in various scientific and engineering disciplines. By studying this course, you will acquire the skills to analyze complex data sets, make accurate predictions, and solve intricate mathematical problems.

Signal processing, for example, involves the analysis of signals that might exhibit divergent behavior. Summability theory provides tools to manipulate and process these signals to obtain meaningful information.

Moreover, the application of summability methods in quantum field theory aids in dealing with infinities arising in particle physics calculations. These methods enable physicists to extract important physical quantities from calculations involving infinite series.

Embarking on an introductory course in summability theory will unravel the mysteries surrounding infinite series. By exploring various summation methods and applications, you will develop a powerful toolbox of mathematical techniques that can be applied to real-world problems.



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An introductory course in summability theory for students, researchers, physicists, and engineers

In creating this book, the authors' intent was to provide graduate students, researchers, physicists, and engineers with a reasonable to summability theory. Over the course of nine chapters, the authors cover all of the fundamental concepts and equations informing summability theory and its applications, as well as some of its lesser known aspects. Following a brief to the history of summability theory, general matrix methods are introduced, and the Silverman-Toeplitz theorem on regular matrices is discussed. A variety of special summability methods, including the Nörlund method, the Weighted Mean method, the Abel method, and the $(C, 1)$ - method are next examined. An entire chapter is devoted to a discussion of some elementary Tauberian theorems involving certain summability methods. Following this are chapters devoted to matrix transforms of summability and absolute summability domains of reversible and normal methods; the notion of a perfect matrix method; matrix transforms of summability and absolute summability domains of the Cesàro and Riesz methods; convergence and the boundedness of sequences with speed; and convergence, boundedness, and summability with speed.

- Discusses results on matrix transforms of several matrix methods
- The only English-language textbook describing the notions of convergence, boundedness, and summability with speed, as well as their applications in approximation theory

- Compares the approximation orders of Fourier expansions in Banach spaces by different matrix methods
- Matrix transforms of summability domains of regular perfect matrix methods are examined
- Each chapter contains several solved examples and end-of-chapter exercises, including hints for solutions

An Introductory Course in Summability Theory is the ideal first text in summability theory for graduate students, especially those having a good grasp of real and complex analysis. It is also a valuable reference for mathematics researchers and for physicists and engineers who work with Fourier series, Fourier transforms, or analytic continuation.

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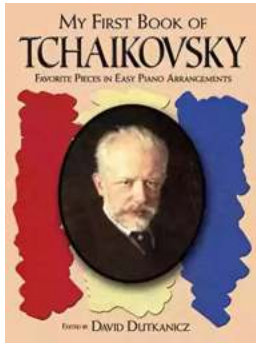
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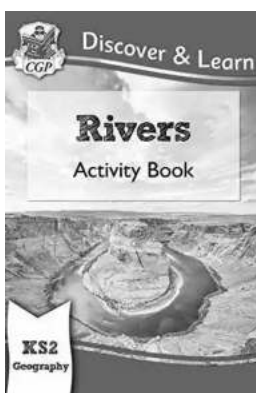
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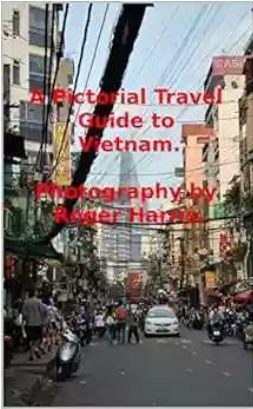
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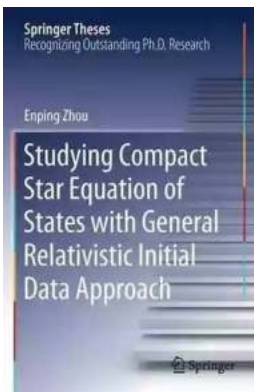
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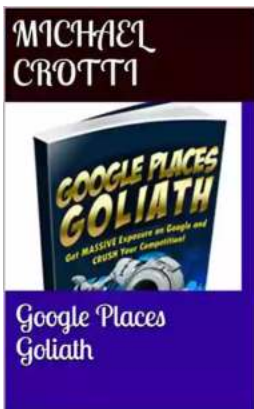
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