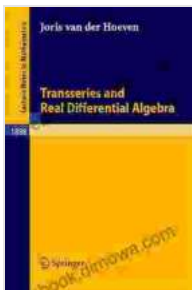# Transseries and Real Differential Algebra: A Journey into the Infinitely Small

In the realm of mathematics, there exists a captivating intersection where the study of infinitely small quantities intertwines with the exploration of algebraic structures. This intersection gives birth to the captivating field of transseries and real differential algebra. Through the masterful work of Philippe Robba, these topics converge in the comprehensive volume titled 'Transseries and Real Differential Algebra,' published as part of the esteemed Lecture Notes in Mathematics series.

Transseries and Real Differential Algebra (Lecture Notes in Mathematics Book 1888) by Joris van der Hoeven

★★★★☆ 4.7 out of 5

Language	: English
File size	: 12365 KB
Print length	: 272 pages
X-Ray for textbooks	: Enabled
Screen Reader	: Supported

This book embarks on a captivating journey into the depths of transseries, providing a rigorous foundation for understanding their properties and applications. Transseries, a generalization of power series, extend the reach of traditional analysis into the realm of non-Archimedean fields, opening up new avenues for exploration.

Transseries: A Bridge Between Analysis and Algebra

The concept of transseries forms the cornerstone of this book, offering a powerful tool for bridging the gap between analysis and algebra. Transseries are formal power series with coefficients in a non-Archimedean field, a field where the usual notion of absolute value is replaced by a more flexible definition. This unique property enables transseries to capture intricate behaviors that elude ordinary power series.

Robba delves into the intricate structure of transseries, unveiling their algebraic and analytic properties. He explores their convergence behavior, their relationship with differential equations, and their connections to other areas of mathematics, such as number theory and algebraic geometry.

Real Differential Algebra: Exploring the World of Smooth Functions

Complementing the study of transseries, Robba ventures into the realm of real differential algebra. This field delves into the study of smooth functions over the field of real numbers, providing a framework for analyzing and understanding the behavior of continuous functions.

Through real differential algebra, Robba sheds light on the fundamental properties of smooth functions, their derivatives, and their integrals. He uncovers the connections between differential algebra and other areas of mathematics, such as topology and algebraic geometry, expanding the scope of applicability for this powerful tool.

Applications and Impact

The theory of transseries and real differential algebra finds applications in a diverse range of fields, including:

- Number theory: Transseries provide a powerful tool for studying the distribution of prime numbers and other number-theoretic problems.

- Algebraic geometry: Transseries are used to study the geometry of algebraic varieties over non-Archimedean fields.

- Differential equations: Transseries are employed to solve differential equations and analyze their solutions.

- Mathematical physics: Transseries and real differential algebra have applications in quantum field theory and other areas of mathematical physics.

A Valuable Resource for Researchers and Students

'Transseries and Real Differential Algebra' serves as an invaluable resource for researchers and students alike. Its comprehensive coverage of these fascinating topics provides a solid foundation for further exploration and groundbreaking discoveries.

Researchers will find in this book a wealth of insights and techniques to advance their work in transseries and real differential algebra. Students, on the other hand, will gain a thorough understanding of these topics, preparing them for future research endeavors.

Philippe Robba's 'Transseries and Real Differential Algebra' is a must-have for anyone seeking a deeper understanding of these captivating mathematical fields. Its rigorous approach, detailed explanations, and wide range of applications make it an indispensable resource that will inspire and guide readers on their mathematical journeys.
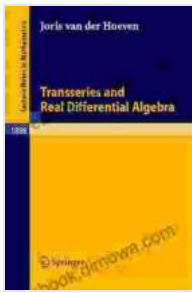
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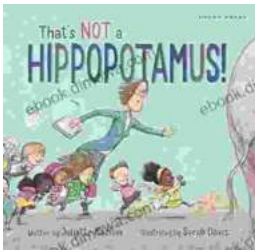File size   : 12365 KB
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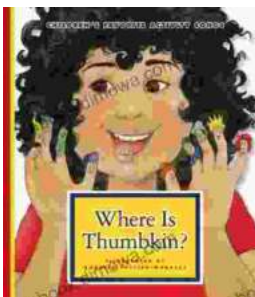X-Ray for textbooks : Enabled
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