

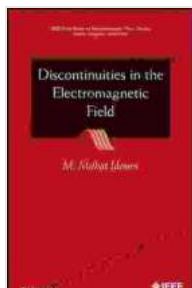
# Delve into the Enigma: Exploring Discontinuities in the Electromagnetic Field with IEEE Press

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The enigmatic realm of electromagnetism captivates the minds of scientists, engineers, and enthusiasts alike. In this realm, the unseen forces that govern the interactions between electric and magnetic fields hold profound significance. Among the fundamental concepts that shape our understanding of electromagnetism is the existence of discontinuities—abrupt changes in the field's properties across a boundary.

## The Book: Discontinuities in the Electromagnetic Field

IEEE Press, renowned for its authoritative publications in the electrical and electronics engineering domain, presents a groundbreaking volume that delves into the complexities of discontinuities in the electromagnetic field. This comprehensive work, meticulously crafted by a team of experts, offers an in-depth exploration of this fascinating topic.



## Discontinuities in the Electromagnetic Field (IEEE Press Series on Electromagnetic Wave Theory Book 40)

by M. Mithat Idemen

★★★★★ 5 out of 5

Language : English

File size : 13867 KB

Text-to-Speech : Enabled

Enhanced typesetting : Enabled

Print length : 240 pages

Lending : Enabled  
Screen Reader : Supported



## **Chapter 1: to Discontinuities**

The book embarks on its journey with an to the concept of discontinuities in the electromagnetic field. It provides a lucid explanation of the types of discontinuities, their origins, and their impact on electromagnetic wave propagation. The chapter also highlights the importance of understanding discontinuities in various applications, such as antenna design and microwave circuits.

## **Chapter 2: Mathematical Analysis of Discontinuities**

Delving deeper, Chapter 2 explores the mathematical tools employed to analyze discontinuities in the electromagnetic field. It introduces integral equations, boundary element methods, and numerical techniques, providing a rigorous framework for understanding the behavior of discontinuities at different frequencies and boundary conditions.

## **Chapter 3: Discontinuities in Waveguides**

Waveguides, essential components in microwave and millimeter-wave systems, play a crucial role in guiding electromagnetic waves with minimal loss. Chapter 3 focuses on the analysis of discontinuities in waveguides, including step discontinuities, irises, and bends. It examines the impact of these discontinuities on wave propagation, reflection, and transmission.

## **Chapter 4: Discontinuities in Antennas**

Antennas, the gatekeepers of wireless communication, rely on discontinuities to shape and direct electromagnetic waves. Chapter 4 investigates the role of discontinuities in antenna design, covering topics such as impedance matching, radiation patterns, and gain enhancement. It provides insights into the design of various antenna types, including patch antennas and microstrip antennas.

## **Chapter 5: Discontinuities in Microwave Circuits**

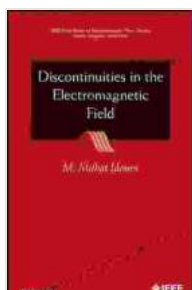
Microwave circuits, the workhorses of modern electronic systems, utilize discontinuities to control and manipulate electromagnetic signals. Chapter 5 delves into the analysis of discontinuities in microwave circuits, including transmission lines, impedance matching networks, and filters. It explores the design techniques and performance characteristics of these circuits in the presence of discontinuities.

## **Chapter 6: Applications in Computational Electromagnetics**

The book concludes with a chapter dedicated to applications in computational electromagnetics. It showcases the use of advanced numerical techniques, such as the finite element method and the method of moments, to model and analyze discontinuities in complex electromagnetic structures. These methods enable engineers to simulate and optimize electromagnetic devices with intricate geometries and boundary conditions.

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Discontinuities in the Electromagnetic Field: IEEE Press on Electromagnetic Wave Propagation is an invaluable resource for researchers, engineers, and students seeking a comprehensive understanding of this fundamental topic. Its in-depth analysis, rigorous mathematical foundations, and real-world applications make it an indispensable guide in the field of electromagnetism. With its insightful content and accessible writing style, this book empowers readers to unlock the secrets of discontinuities and harness their transformative power in various engineering applications.



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