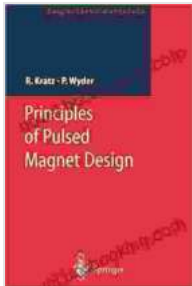


Principles Of Pulsed Magnet Design Engineering Materials



Principles of Pulsed Magnet Design (Engineering Materials) by Robert Kratz

★★★★☆ 4.7 out of 5

Language : English

Text-to-Speech : Enabled

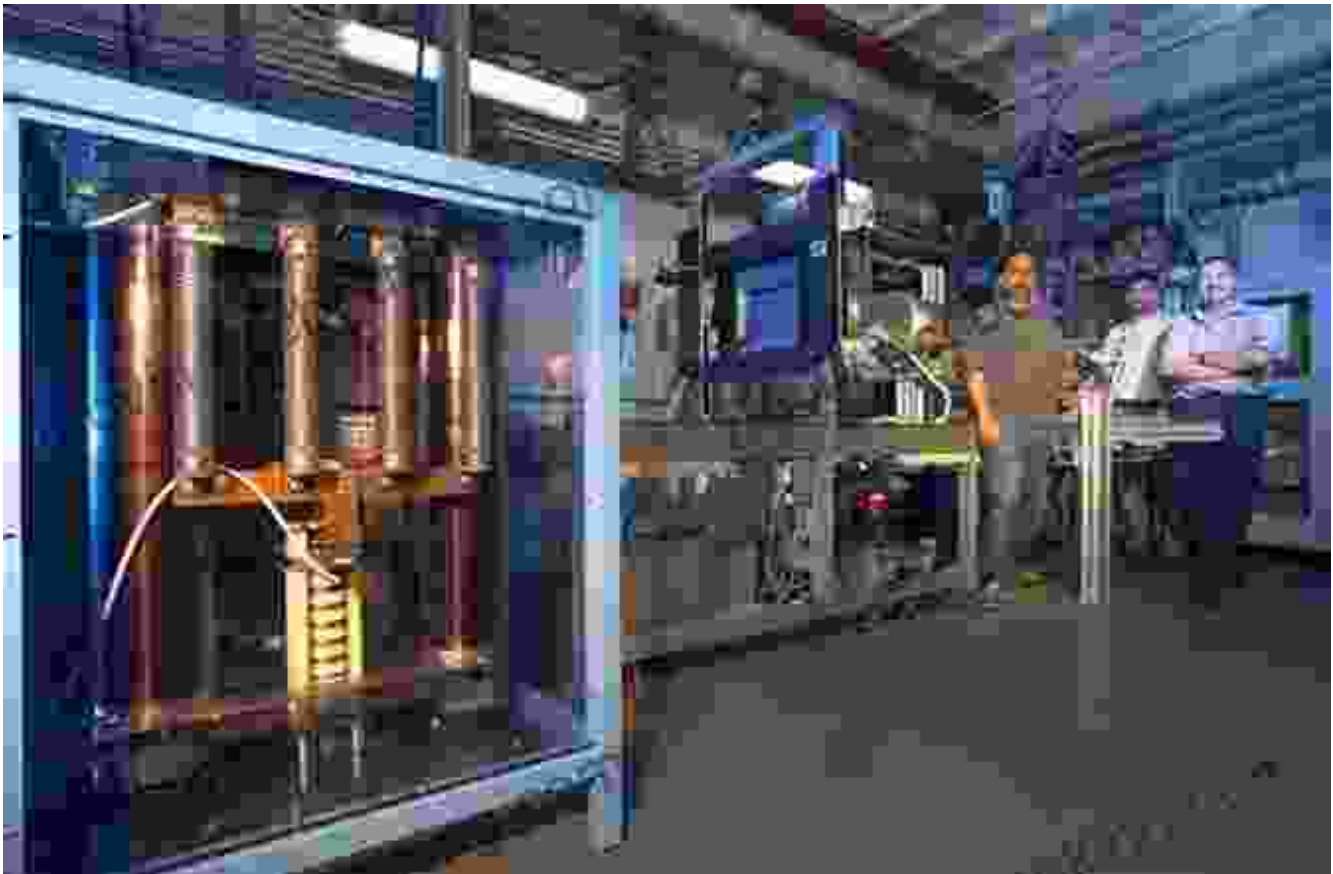
File size : 3229 KB

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Pulsed magnets, with their ability to generate intense magnetic fields for short durations, have revolutionized various industries, from scientific research to medical applications. To harness the full potential of these powerful devices, a thorough understanding of the principles and materials involved in pulsed magnet design is essential. This comprehensive guidebook delves into the intricacies of pulsed magnet engineering, providing a comprehensive overview of the materials and techniques that enable the creation of cutting-edge pulsed magnet devices.

Chapter 1: Principles of Pulsed Magnet Design

This chapter lays the theoretical foundation for pulsed magnet design. It explores the fundamental principles governing the generation and control of pulsed magnetic fields. Topics covered include energy storage and discharge, coil design, field shaping, and the impact of various factors on pulsed magnet performance.

Chapter 2: Engineering Materials for Pulsed Magnets

The choice of materials plays a crucial role in determining the performance and efficiency of pulsed magnets. This chapter introduces the key material properties that influence pulsed magnet design, such as electrical conductivity, strength, and magnetic permeability. It also discusses the advantages and limitations of different material classes, including metals, alloys, and composites.

Chapter 3: High-Energy Pulsed Magnets

High-energy pulsed magnets are capable of generating extremely strong magnetic fields for brief periods. This chapter focuses on the design considerations and materials used in these high-power devices. It explores

the challenges and techniques associated with handling and dissipating the immense energy involved in pulsed magnet operation.

Chapter 4: Pulsed Magnets for Scientific Research

Pulsed magnets have become indispensable tools in scientific research, enabling the study of materials and phenomena under extreme magnetic field conditions. This chapter discusses the specialized design requirements and materials employed in pulsed magnets used for applications such as nuclear magnetic resonance (NMR) spectroscopy, particle accelerators, and plasma physics.

Chapter 5: Pulsed Magnets in Medical Applications

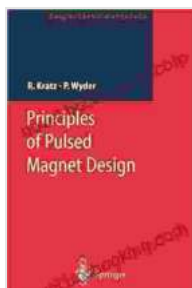
The ability of pulsed magnets to penetrate biological tissues makes them valuable in various medical applications. This chapter explores the design and materials considerations for pulsed magnets used in magnetic resonance imaging (MRI), transcranial magnetic stimulation (TMS), and magnetic drug delivery.

Chapter 6: Emerging Applications of Pulsed Magnets

Beyond scientific research and medical applications, pulsed magnets are finding innovative uses in various emerging fields. This chapter highlights the potential of pulsed magnets in areas such as energy storage, wireless power transfer, and space exploration. It discusses the challenges and opportunities associated with these novel applications.

The principles and materials of pulsed magnet design are essential knowledge for engineers and scientists seeking to develop innovative pulsed magnet devices. This guidebook provides a comprehensive overview of the field, empowering readers with the insights and tools

necessary to harness the full potential of pulsed magnets. By understanding the interplay between design principles and engineering materials, professionals can unlock new possibilities in the fields of scientific research, medical applications, and beyond.



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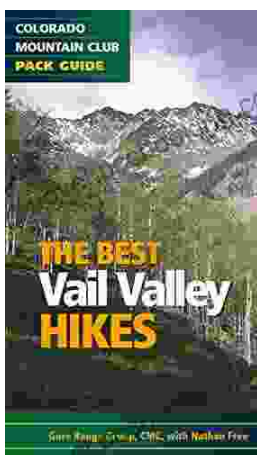
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