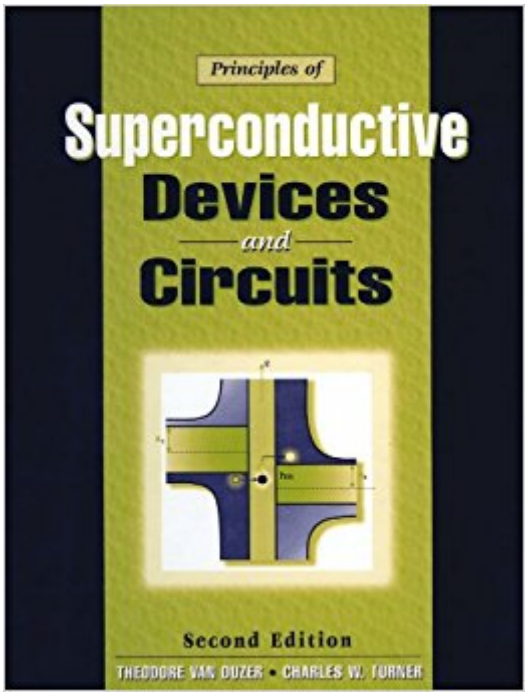
Principles Of Superconductive Devices And Circuits (2nd Edition)



Synopsis

KEY BENEFIT:The field of applied superconductivity has been transformed by new materials, new fabrication methods, innovative device and circuit concepts, and the discovery of high-temperature superconductors. In this book, two of the field's leading experts present an authoritative, up-to-date guide to the theory and current practice of superconductivity.KEY TOPICS:The book begins by introducing normal metal behavior at low temperatures, and the phase transition to superconductivity. It presents the classic Meissner experiment, and reviews several key theories essential to practical analysis. In each case, the book helps readers develop an intuitive understanding, while minimizing the quantum mechanics and thermodynamics required. Coverage includes an up-to-date analysis of microwave and millimeter-wave applications; a richly-developed treatment of Josephson junctions and devices; advanced high-temperature oxide superconductor applications; Ginzburg-Landau equations; Type II superconductivity theories and technologies; and more. The CD-ROM contains valuable software for circuit simulation and inductance calculations.MARKET:All electrical engineering and applied physics professionals working in R&D in industrial, university or government settings; as well as advanced students of applied superconductivity.

Book Information

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Customer Reviews

Principles of Superconductive Devices and Circuits, Second Edition, lays the analytical foundation for understanding a wide range of modern applications of both low- and high-temperature

superconductors. It represents an extensive update to the first edition, which has been used worldwide and translated into Japanese, Russian, and Chinese. The field of applied superconductivity has been transformed since the first edition by new materials and fabrication techniques, and by innovative device and circuit concepts. In this new edition, two leading experts provide an up-to-date guide to the theory and practice of applied superconductivity.

Preface to the Second Edition Several exciting major developments have changed the field of applied superconductivity since 1981, when the first edition of this text was published. New materials and fabrication methods and innovative device and circuit concepts have made profound changes in the way we practice in this field. The most public of the changes was the discovery in 1986 of high-temperature oxide superconductors, several of which quickly were shown to have transition temperatures above the boiling point of nitrogen. Equally important but less publicly obvious was a pair of key innovations in the fabrication of superconductive integrated circuits. A way of making high quality, durable niobium tunnel junctions and a procedure to avoid any processing steps intervening in the fabrication of the junctions, has led to stable, well controlled integrated circuits. New concepts in superconductive detectors and mixers has made superconductivity the technology of choice in millimeter wave radio astronomy. And in the digital field, innovative ideas for single flux quantum logic and for hybridization with semiconductor devices have brought new opportunities. To date, the high-temperature superconductors have had their major impacts in magnetometers and microwave receivers. The greatly reduced refrigerator burden when using these materials compared with the metal superconductors has stimulated very extensive research on making cables for extremely high field magnets, and optimism for use in power systems. The basic theory of superconductivity we presented in the 1981 edition is still very useful. There is, as yet, no accepted theory of electron pairing in the high-temperature superconductors and much of the practical work, including that on high-temperature superconductors, still relies on the theories in this book. Phenomenological theories have been developed to explain the behavior of high-temperature superconductors. And the low-temperature metallic superconductors continue to be of major importance, not least because of the success of Nb-Ti alloy in MRI magnets, by far the largest commercial market for superconductors. The low-temperature superconductor wire technology has matured over the past two decades and continues to make impressive progress. On the other hand, the fast pace of development of the physics and technology of the high-temperature superconductors presents us with a difficult choice. We have chosen to present a practical view of the current position, but freely admit that new results in this rapidly changing field may lead to a

complete reappraisal. Between us two co-authors, we have had several decades of experience with applications of superconductivity, both in the university and in industry. We have attempted to infuse the presentations, particularly of the electronics part, with our practical views that we hope will be helpful to the readers. We thank several colleagues in the field including John Clarke, James Lukens, V. K. Kaplunenko, William McGrath, Oleg Mukhanov, Paul Richards, Andrew Smith, Stephen Whiteley, Yongming Zhang, who were very helpful with suggestions on sections in their areas of special expertise and in providing valuable data. Feedback from numerous students over the years has helped to form the presentations. The need to prepare camera-ready copy for this edition led to the involvement of a large number of people in the Department of Electrical Engineering and Computer Sciences at the University of California, Berkeley, to whom we are deeply grateful. We appreciate their generous giving of time and talent. Carol Sitea was responsible for a part of the typing, inserting scores of figures into the text and making corrections, managing the computer aspects of the project, and finally pulling the manuscript together. Thank you Carol! We appreciate that Joyce McDougal generously organized the staff and participated in the typing of several chapters. Invaluable was the volunteered help from Christine Colbert, Dianna Bolt, and Jay Ento, each of whom typed several chapters. Jennifer Basler's help is appreciated. George Chien played a key role in assembling and modifying some of the most changed chapters. Important computations were carried out by Yiqun Phillip Xie and Lizhen Zheng and Mark Jeffery provided valuable assistance. The artistic and computer talents of Katherina Law came together to create close to one hundred new figures, matching them in style to those of the first edition. The willing help of Luis Vasquez in carefully scanning hundreds of figures from the first edition and doing extensive library research were essential to the timely completion of the project, and greatly appreciated. Even our wives, Janice and Shan, volunteered help in proofreading and other ways; how can we thank them enough? Getting this edition into camera-ready form has truly been a community project and we are thankful to all who had a role. T. Van Duzer, Berkeley C. W. Turner, London

There is a more expensive next edition, but all the basics are here. The math is not for the timid, but it doesn't get in the way of the physical effects.

This book starts from the basic physics of superconductivity and deals with superconducting devices, such as SQUIDs, SIS mixers and Single Flux Quantum devices. The treatments of each device are based on the current research, so that readers easily get the front of the fields. It also

includes a prenty of important papers as the references and thus you can easily get into the deep level. I found one disadvantage that there is no statements on single electron/Cooper pair tunneling phenomena. I recommend this book for the persons to study superconducting electronics from students to the experts in this field. This book is valuable even for the persons who read the first editon because each treatments are updated.

Principles of Superconductive Devices and Circuits (2nd Edition) CMOS Digital Integrated Circuits: A First Course (Materials, Circuits and Devices) Selected Topics in RF, Analog and Mixed Signal Circuits and Systems (Tutorials in Circuits and Systems) Power Electronics: Circuits, Devices and Applications (3rd Edition) Introductory Electronic Devices and Circuits: Conventional Flow Version, Sixth Edition Introductory Electronic Devices and Circuits: Electron Flow Version (5th Edition) Introductory Electronic Devices and Circuits: Conventional Flow Version (5th Edition) Electronics Fundamentals: Circuits, Devices & Applications (8th Edition) Sensors, Actuators, and Their Interfaces: A Multidisciplinary Introduction (Materials, Circuits and Devices) Contemporary Electronics: Fundamentals, Devices, Circuits, and Systems Photodetectors: Devices, Circuits and Applications Introductory Electronic Devices and Circuits Introduction to Biomechatronics (Materials, Circuits and Devices) Foundations of Electronics: Circuits & Devices Conventional Flow Integrated circuit devices and components (Integrated-circuit technology, analog and logic circuit design, memory and display devices) Prostheses: Design, Types, and Complications (Biomedical Devices and Their Applications; Medical Devices and Equipment) US Army Technical Manual, ARMY DATA SHEETS FOR CARTRIDGES, CARTRIDGE ACTUATED DEVICES AND PROPELLANT ACTUATED DEVICES, FSC 1377, TM 43-0001-39, 1991 ISO 14971:2007, Medical devices - Application of risk management to medical devices ISO 14971:2000, Medical devices -- Application of risk management to medical devices Principles of Electric Circuits: Conventional Current Version (9th Edition)