Physics : Strongly Correlated Systems, Superconductivity

Gulian, Armen, Chapman University, ASHTON, MD, USA

Shortcut to Superconductivity

Superconducting Electronics via COMSOL Modeling

- **Offers an intuitive, concept-driven introduction to superconductivity suitable for a broad audience**
- **Supported by an extensive library of COMSOL multiphysics simulation codes to illustrate key concepts**
- **Supplemented by worked examples and problem sets throughout**

This accessible textbook offers a novel, concept-led approach to superconducting electronics, using the COMSOL Multiphysics package to help describe fundamental principles in an intuitive manner. Based on a course taught by the author and aimed primarily at engineering students, the book explains concepts in an effective yet efficient way, uncovering the "shortcut" to understanding each topic to enable readers to quickly grasp the underlying essence. The book is divided into two main parts; the first part provides a general introduction to key topics encountered in superconductivity, illustrated using COMSOL simulations based on time-dependent Ginzburg-Landau equations (considering them as given) and avoiding any deeply mathematical derivations. It includes numerous worked examples and problem sets with tips and solutions. The second part of the book is more conventional in nature, providing detailed derivations of the basic equations from first principles. This part covers more advanced topics, including the BCS-Gor'kov-Eliashberg approach to equilibrium properties of superconductors, the derivation of kinetic equations for nonequilibrium superconductors, and the derivation of time-dependent Ginzburg–Landau equations, used as the basis for COMSOL modeling in the first part. Supported throughout by an extensive library of COMSOL Multiphysics animations, the book serves as a uniquely accessible introduction to the field for engineers and others with a less rigorous background in physics and math. However, it also features more detailed mathematical background for those wishing to delve further into the subject.

Springer

1st edition

Due 2020-05-01
1st ed. 2020, Approx. 250 p. 100 illus., 30 illus. in color. With online files/update.

Printed book
Hardcover

Book w. online files/update
Hardcover
ISBN 978-3-030-23485-0
Ca. $ 84,99

Planned

Discount group
Professional Books (2)

Product category
Graduate/advanced undergraduate textbook

Order online at springer.com/booksellers
Springer Nature Customer Service Center LLC
233 Spring Street
New York, NY 10013
USA
T: +1-800-SPRINGER NATURE
(777-4643) or 212-460-1500
customerservice@springernature.com

ISBN 978-3-030-23485-0 / BIC: TJFD5 / SPRINGER NATURE: SCP25064

Prices and other details are subject to change without notice. All errors and omissions excepted. Americas: Tax will be added where applicable. Canadian residents please add PST, QST or GST. Please add $5.00 for shipping one book and $ 1.00 for each additional book. Outside the US and Canada add $ 10.00 for first book, $5.00 for each additional book. If an order cannot be fulfilled within 90 days, payment will be refunded upon request. Prices are payable in US currency or its equivalent.

Part of SPRINGER NATURE