



# An Introduction to Applied Electromagnetics and Optics

By Vladimir V. Mitin, Dmitry I. Sementsov

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Modern technology is rapidly developing and for this reason future engineers need to acquire advanced knowledge in science and technology, including electromagnetic phenomena. This book is a contemporary text of a one-semester course for junior electrical engineering students. It covers a broad spectrum of electromagnetic phenomena such as, surface waves, plasmas, photonic crystals, negative refraction as well as related materials including superconductors. In addition, the text brings together electromagnetism and optics as the majority of texts discuss electromagnetism disconnected from optics. In contrast, in this book both are discussed. Seven labs have been developed to accompany the material of the book.

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#### Review

"...provides a clear explanation and introduction to applied electromagnetics and optics. This very readable book begins with the foundations of the fields and then successfully covers a number of timely topics that have wide ranges of potential applications."

? Michael A. Stroschio, University of Illinois at Chicago, USA

"This book is well written, not overly mathematical, methodical, and combines a thorough coverage of fundamentals with up-to-date results, such as superconductors, surface waves, plasmas, photonic crystals, and negative refraction."

? Michael Shur, Rensselaer Polytechnic Institute, Troy, New York, USA

"The book's contents give students not only fundamental knowledge about electrodynamics, but also practical ideas for applications to device, antenna, and waveguide implementations with truly physical and electrodynamic theories. Organizing the book this way gives strong benefits to all students in wide aspects of related fields like electrical engineering and applied physics, as well as material science courses students."

? Taiichi Otsuji, Tohoku University, Sendai, Japan

"This book is appropriate for both students as an excellent electromagnetics text and for engineers as a great reference. A rigorous mathematics presentation and thoughtful organization structure develop a step by step expertise from traditional solutions of Maxwell equations in isotropic medium, interfaces and transmission lines to advanced anisotropic, periodic and negative index materials. The book provides a unified approach to different EM and optical problems and illustrates them with many solved examples. The reader will require some knowledge of mathematics and general physics for clear understanding of the material, but as a result, will acquire confidence in understanding of this essential subject for modern engineering disciplines."

? Serge Oktyabrsky, SUNY Polytechnic Institute, Utica, New York, USA

"This book is comprehensive, methodical and not overly mathematical. The earlier versions of its manuscript were used in teaching a course in applied electromagnetics. Examples (and their solutions) on different topics at each chapter's end, complete with hints and answers, help readers to master the material. This book is appropriate for both a one-semester course for electrical engineers and as a reference book for applied physics and materials science graduate students."

? *Optics & Photonics News*, June 2017

#### About the Author

Vladimir V. Mitin is SUNY Distinguished Professor in the Department of Electrical Engineering and Adjunct Professor of Physics at the University at Buffalo, The State University of New York. He is a Fellow of IEEE, SPIE, APS, AAAS, and IoP and the author of five textbooks, four research monographs, and more than 260 research articles published in refereed journals.

Dmitry I. Sementsov is Professor of Physics at Ulyanovsk State University, Russia. He is the author of one textbook and more than 420 research papers published in peer-reviewed journals.

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