

Elementary Electromagnetism Using Python

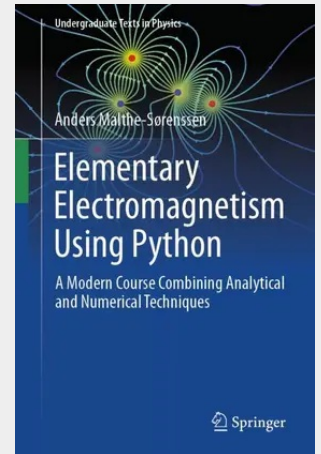
A Modern Course Combining Analytical and Numerical Techniques

This textbook presents the core elements of an introductory electromagnetism course, integrating computational methods throughout the explanations, examples, and exercises. This approach helps students develop stronger problem-solving skills, enabling them to tackle complex and realistic physics problems earlier than would be possible using only analytical techniques. It promotes creativity, encourages exploration, and equips students with the tools to become active investigators while learning physics.

The book's philosophy is to provide worked examples that demonstrate the full workflow of solving physics problems, from modeling a system and simplifying it to an analytically solvable form to solving the complete model using computational methods. Each theoretical and computational step is clearly explained. Key computational techniques include numerical line, surface, and volume integrals; solutions to Laplace's and Poisson's equations; and computational analyses of simple and complex circuits. Laplace's and Poisson's equations receive particular emphasis, as the computational tools developed allow students to study complex systems in depth. By applying similar computational methods across different topics, students can identify connections within the theory and build confidence and proficiency.

The book offers clear explanations of both analytical and computational techniques and includes a wide range of exercises: discussion questions, skill-building tutorials, advanced homework problems, and extended projects that combine analytical and computational approaches in rich, contextual settings.

This textbook presents the core elements of an introductory electromagnetism course, integrating computational methods throughout the explanations, examples, and exercises. This approach helps students develop stronger problem-solving skills, enabling them to tackle complex and realistic physics problems earlier than would be possible using only analytical techniques. It promotes creativity, encourages exploration, and equips students with the tools to become active investigators while learning physics. The book's philosophy is to provide worked examples that demonstrate the full workflow of solving physics problems, from modeling a system and simplifying it to an analytically solvable form to solving the complete model using computational methods. Each theoretical and computational step is clearly explained. Key computational techniques include numerical line, surface, and volume integrals; solutions to Laplace's and Poisson's equations; and computational analyses of simple and complex circuits. Laplace's and Poisson's equations receive particular emphasis, as the computational tools developed allow students to study complex systems in depth. By applying similar computational methods across different topics, students can identify connections within the theory and build confidence and proficiency. The book offers clear explanations of both analytical and computational techniques and includes a wide range of exercises: discussion questions, skill-building tutorials, advanced homework problems, and extended projects that combine analytical and computational approaches in rich, contextual settings.



80,24 €

74,99 € (zzgl. MwSt.)

vorbestellbar, Erscheinungstermin ca.
August 2026

Artikelnummer: 9783032198754

Medium: Buch

ISBN: 978-3-032-19875-4

Verlag: Springer Nature Switzerland AG

Erscheinungstermin: 20.08.2026

Sprache(n): Englisch

Auflage: Erscheinungsjahr 2026

Serie: Undergraduate Texts in Physics

Produktform: Kartoniert

Seiten: 523

Format (B x H): 155 x 235 mm

