



Numerical Methods in Photonics (Optical Sciences and Applications of Light)

Andrei V. Lavrinenko, Jesper Lægsgaard, Niels Gregersen, Frank Schmidt, Thomas Søndergaard

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Simulation and modeling using numerical methods is one of the key instruments in any scientific work. In the field of photonics, a wide range of numerical methods are used for studying both fundamental optics and applications such as design, development, and optimization of photonic components. Modeling is key for developing improved photonic devices and reducing development time and cost.

Choosing the appropriate computational method for a photonics modeling problem requires a clear understanding of the pros and cons of the available numerical methods. **Numerical Methods in Photonics** presents six of the most frequently used methods: FDTD, FDFD, 1+1D nonlinear propagation, modal method, Green's function, and FEM.

After an introductory chapter outlining the basics of Maxwell's equations, the book includes self-contained chapters that focus on each of the methods. Each method is accompanied by a review of the mathematical principles in which it is based, along with sample scripts, illustrative examples of characteristic problem solving, and exercises. MATLAB® is used throughout the text.

This book provides a solid basis to practice writing your own codes. The theoretical formulation is complemented by sets of exercises, which allow you to grasp the essence of the modeling tools.

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