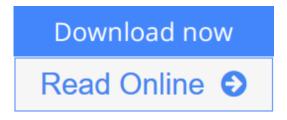# Finite Element Methods for Maxwell's Equations (Numerical Mathematics and Scientific Computation)

By Peter Monk

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Since the middle of the last century, computing power has increased sufficiently that the direct numerical approximation of Maxwell's equations is now an increasingly important tool in science and engineering. Parallel to the increasing use of numerical methods in computational electromagnetism there has also been considerable progress in the mathematical understanding of the properties of Maxwell's equations relevant to numerical analysis. The aim of this book is to provide an up to date and sound theoretical foundation for finite element methods in computational electromagnetism. The emphasis is on finite element methods for scattering problems that involve the solution of Maxwell's equations on infinite domains. Suitable variational formulations are developed and justified mathematically. An error analysis of edge finite element methods that are particularly well suited to Maxwell's equations is the main focus of the book. The methods are justified for Lipschitz polyhedral domains that can cause strong singularities in the solution. The book finishes with a short introduction to inverse problems in electromagnetism.

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"This book is very well written, thoughfully organized, and technically sound...Undoubtedly, it will become a standard reference text and should be on the bookshelves of those who are interested in the numerical solution of electromagnetic filed problems."--*Mathematics of Computation*

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