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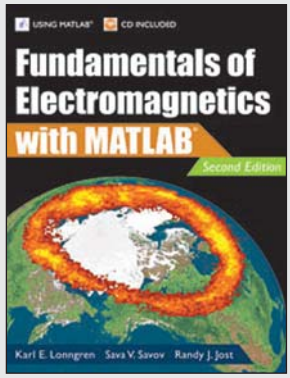
# DESIGN NOTES

## A Book Review, Plus Notes on Electromagnetics

With the release of a new edition, *Fundamentals of Electromagnetics with MATLAB* has become an even more valuable tool for teaching (and learning) EM principles. The book features an accompanying CD with extensive supporting material, including a tutorial on MATLAB for new users, MATLAB files, optional supplemental material that expands the contents to more advanced topics (useful for a second term course), and a variety of application descriptions in PDF format to answer the age-old question of EM students, "Why do I need to learn this stuff?"

The other special feature of the book is a supporting Web site that contains an evolving collection of material submitted by the authors, instructors using the book in their classes, and individuals who use the book as a reference text. The additional material includes MATLAB programs, projects, applications, and any other pertinent topic.




***Fundamentals of Electromagnetics with MATLAB***
Karl. E. Lonngren, Sava V. Savov, Randy J. Jost
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## Electromagnetics in Engineering Education and the Engineering Profession

99.9% of Electrical Engineering curricula include at least one course on Electromagnetics. Some courses follow the development of physics theory leading to Maxwell's equations, some start with transmission lines and fill in the theory along the way, while yet other courses are centered around Maxwell's equations and their relationship with relativity.

Whatever the approach, too many engineers forget the details of their EM courses as they concentrate on careers that specialize in other areas of electronic circuits and systems. Hopefully, most of the practical implications of EM fields and waves are remembered, since they effect all electronics, especially at high frequencies.

## A Few Pertinent Comments by the Authors

Since this is a teaching text useful in both coursework and personal continuing education, it seemed appropriate to share some of the authors' comments on the book's development and the subject of EM:

First, the inclusion of MATLAB programs is intended to enhance the subject, allowing full solutions to some of the complex numerical computations that are not practical in a one semester course. Also, MATLAB's graphical display of abstract, unobservable waves offers a strong visual representation that cannot be gotten in the classroom or laboratory.

And since MATLAB was used to generate many of the illustrations in the book, the same code can be included on the CD or Web site to allow expansion or animation of those figures.

In a classroom, the rigor of an EM course allows little time to explore practical applications. The CD includes notes on applications that can help overcome this problem, which is typical of most EM classes.

Finally, the authors are clear on the subject of in-depth mathematics—"You will encounter scads of equations in your study of Electromagnetics." Part of that math is adapting to different notation methods. This comes with the territory when studying the physical sciences. To minimize confusion, the authors outline their chosen notational scheme for coordinate systems, and for the symbols used to represent essential parameters such as charge, flux density, electric and magnetic dipole moment, as well as other parameters used to describe physical systems.

Like many good textbooks, this one includes useful reference information inside the front and back covers. These include a summary of vector operations in Cartesian, cylindrical and spherical coordinate systems, along with the usual physical constants such as Boltzmann and Planck constants, proton and electron mass and charge, permeability and characteristic impedance of a vacuum, and others. A few key mathematical operations are also included—useful integrals, trigonometric relations and approximations for small quantities.

If you are reading this magazine, you cannot avoid Electromagnetics. This book may be the right one to restore forgotten lessons from that long-ago EM course!