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Microwave engineering pozar 3rd edition pdf download

Copyrighted MaterialCopyright materialForesible:}')',! Because education should be the accumulation of understanding, not just an accumulation of facts, I have tried to write a textbook that emphasizes the basic concepts of electromagnetic agents, wave procreation, network analysis and design principles applied to modem microwave engineering. Although I have avoided the handbook approach, in which a large amount of information is presented with little or no explanation or context, a significant amount of material in this book is related to the design of specific microwave circuits and components, for both practical and motivating value. I have tried to present the analysis and logic behind these designs so that the reader can see and understand the process of using basic concepts to arrive at useful results. The engineer who bases a finding understanding of the basic concepts and principles of microwave engineering, and has seen how these can be applied to a particular design goal, is the engineer who is most likely to be rewarded with a creative and productive career. Modem microwave engineering involves predominantly distributed circuit analysis and design, as opposed to waveguide and field theory orientation of previous generations. Most microwave engineers today design planary components and integrated circuits without direct recourse to electromagnetic analysis. Microwave computer-assisted design (CAD) software and network analyzers are the main tools of today's microwave engineer, and microwave engineering education must respond to this shift in weight to network analysis, planary circuits and components, and active circuit design. Microwave engineering will always involve electromagnetics (many of the more sophisticated microwave CAD packages implement strict field theory solutions), and students will still benefit from an exposure to that waveguide modes and coupling through apertures, but the change in weight to microwave circuit analysis and design is clear. Microwave and RF technology are more pervasive than ever. This is especially true in the commercial sector, where modem applications include mobile phones, personal communication systems, wireless local computer networks, millimeter wave collision avoidance vehicle radars, direct broadcasting satellites for radio and television, global positioning systems, radio frequency identification marking, ultra broadband radio and radar systems, and microwave remote sensing systems for the environment. Defense systems continue to rely heavily on microwave technology for passive and active sensor, communication and weapon control systems. This condition suggests that there will be no shortage of challenging problems in RF and microwave engineering for the foreseeable future, and a clear need for engineers who have both a of the basics of microwave engineering such as weU as creativity to apply this knowledge to problems of practical interest.viiPrefaceThe success of the first two editions of Microwave Engineering has been pleasing. For this edition, we asked for detailed feedback from teachers and readers for their thoughts on which topics to delete and add. There was virtually no agreement on specific material to remove (it seemed that almost all themes in the book were used by anyone). However, it was quite unifornn agreement in favor of more material on active circuit design and related topics. To this end, we have increased the number of chapters from 12 to 13 and have added new material to noise, non-linear effects. RF-mems, diod and transistor unit characteristi.s; p. uaa & lstrp9 ~ 6 (-aniplifi ~ rs. FE'i mixers, transistor oscillators, oscillator phase nois ~, and frequencfm ~ ltipliers. Section ~ on intennodulation products, dynamic range, mixers, antennas, ai, Id reeiver design has been completely rewritten. Numerous new or revised examples and problems. ha.ve been added, with several of these related to practical design prb, ~f~p! S... invocation planar. Circuits and components. Another new feature in this edition is a list of answers to selected issues at the end of the book. Topics cut for this edition include the uniqueness theorem, Fabry-Perot resonators, electronic warfare, and some examples related to waveguides. This text is the wriuen for a two-semester course in microwave engineering, for senior or first year graduate students. If students have a good background in lower electromagnetic, the material in chapters 1 and 2 can be reviewed fairly quickly. Students from smaller backgrounds should study this material in more detail. Chapters 3-13 can then be followed in sequence, but it is likely that the instructor will want to choose between a field theory weight (chapters 3-9, 13), or more of a circuit design weight (Chapters 4-8, 10-12). Alternatively, it is possible to focus exclusively on microwave circuit design by selectively covering chapters 2, 4-8, and 10-13, avoiding the material on electromagnetic analysis. Two key elements that should be included in a successful course on microwave engineering are the use of computer-assisted design (CAD) simulation software and a microwave laboratory experience. Giving students access to CAD software allows them to verify the results of the design-oriented issues in the text, providing instant feedback that builds trust and makes their efforts more rewarding. Because the drudgery of repetitive calculation is eliminated, students can easily try alternative approaches and explore problems in more detail. The effect of line loss, for example, is explored in several examples and problems- this would be effectively impossible without the use of modem CAD tools. Classroom exposure to CAD tools provides a useful experience when you're done. Most of the commercially available microwave CAD tools are very expensive, but several manufacturers provide academic discounts or free student versions of their products. Ansoft Corporation, for example, has a student version of their popular SERENADE package available for free download on their website (www.ansoft.com). A convenient microwave instruction lab is expensive to equip, but provides the best way for students to develop an intuition and physical feel for microwave phenomena. A laboratory with the first semester of the course can cover measurement of microwave power, frequency, standing wave conditions, impedance and S parameters, as well as characterization of basic microwave components such as tuners, couplers, resonators, loads, circulation pumps and filters. Important practical knowledge of contacts, wave guides and microwave test equipment will be acquired in this way. Alternatively, a more advanced laboratory session can consider topics such as noise figure, intennodulation distortion and mixing. Naturally, the type of experiments that can be offered is strongly dependent on the test equipment available. With this release, we can make available more resources for students and instructors on the Wiley website. A sample instructional laboratory manual, along with SERENADE circuit files for many of the problems and examples in the text, can be found on www.wiley.com/college/pozar. An on-line solution manual for all problems iPrefaceviiitext is available to qualified instructors, who can apply for access through the site www.wiley.com/college/pozar and go to the instructor's Companion Site.ACKNOWLEDGMENTSMane people deserve my thanks for their help to complete this book, especially the many students and teachers who have used the first two editions of Microwave Engineering. I would also like to thank my colleagues in the microwave engineering group at the University of Massachusetts at Amherst for their support and collegiality over the years. In particular, Keith Carver and Bob Jackson made several useful suggestions and contributions. Juraj Bartolic (University of Zagreb) provided simplified diversion of J.L. parameter stability criteria in Chapter 11. I am grateful to the following people for giving photographs: Dr. Naresh Deo ofMillitech Corp., Dr. John Bryant of the University of Michigan, Mr. Harry Syrigos of Alpha Industries, Professor Cal Swift, Professor Bob Jackson and Mr.B. Hou of the University of Massachusetts, Mr. J. Wendler of MIA-COM, Dr. Mike Adlerstein and Mr. Russell of the Raytheon Company, Mr. Hugo Vifian of hewlettpackard and Dr.M.Abouzahra from The Lincoln Laboratory. Finally, I would like to thank Bill Zobrist and the staff of John Wiley & Sons for their help and professionalism during this project. David M. PozarAmherst, MA"iExecutive Editor Senior Production Editor Senior Design Manager Illustration Editor Cover design/ illustrationBill Zobrist Petrina Kulek Kann Kincheloe Gene Aiello Carol C. GrobeThis book was put in Times Roman 10/12 by TechBooks and printed and bound by Hamilton Printing. The cover was printed by Phoenix Color. This book is printed on acid-free paper. @Copyright 0 2005 John Wiley &, . 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