Allen Glisson
Dept. of Electrical Engineering
University of Mississippi
PO Box 1848
University, MS 38677-1848 USA
+1 (662) 915-5353
+1 (662) 915-2731 (Fax)
aglisson@olemiss.edu (e-mail)

Microstrip Antenna Design Handbook, by Ramesh Garg, Prakash Bhartia, Inder Bahl, and Apisak Ittipiboon, Artech House, 2001, xxv+875 pages, $145.00, ISBN 0-89006-513-6.

The first book on microstrip antennas was written by Drs. Bahl and Bhartia in 1980. That book, which has been out of print for some time, still is in wide use. There has been significant development in the field since the first book appeared, along with several books dealing with one or more specific topics, but none that provides a comprehensive and thorough treatment of the subject. This book goes a long way towards fulfilling this need. The authors address the basics of microstrip-antenna theory, and also highlight recent design methodologies and practical applications. Various types of microstrip antennas, such as rectangular patches, circular disks, rings, dipoles, and slot antennas, are described. Pressing issues, such as techniques for producing circularly polarized antennas, broadening bandwidth, and dual-frequency and active integrated microstrip antennas and arrays are emphasized. The book also provides useful appendices dealing with planar transmission lines, essential for understanding the feed systems, and essential information on the substrates used for microstrip-antenna fabrication. The selection of topics provides the reader with a very wide range of information on the topic.

Chapter 1 provides a brief introduction of the topic, microstrip-antenna advantages and disadvantages, various shapes and configurations, feeding mechanisms, and some of the applications. Information on radiation mechanisms and the evaluation of radiation fields and surface waves is also provided. The limitation presented by surface-wave propagation, and the use of photonic or electromagnetic bandgap structures as a recent solution to the problem, are discussed.

Analysis techniques have advanced considerably since 1980, and the material in the next two chapters well reflects these advancements, and, along with the references provided, should provide both designers and researchers with a good basic understanding of the subject. Chapter 2 describes models that are essential for the design process. Details of the basic transmission-line and cavity models, their generalized versions, and qualitative comparisons, are provided. Full-wave analysis techniques are described in Chapter 3, where emphasis is given to the spectral-domain technique, mixed-potential integral-equation analysis, and finite-difference time-domain analysis.

Details on the design and analysis of the most common microstrip antennas are given in Chapters 5 through 7. These include rectangular and circular antennas, along with a comparison between these two configurations; annular-ring; dipoles; triangular; and slot antennas. The material is covered in a comprehensive and easy-to-use manner, and a good list of references is provided.

Various techniques for producing circularly polarized microstrip antennas, and various feeding schemes, are described in Chapter 8. This is followed by techniques for broadening bandwidth in Chapter 9, where the selection of substrates, proper feeding, multi-moding, and other approaches are discussed.

Loading microstrip antennas to achieve special characteristics is discussed in Chapter 10. Techniques to achieve characteristics such as size reduction, multi-frequency operation, and polarization or radiation-pattern control are described. A good and useful comparison of a number of compact microstrip antennas is provided.

Active antennas, with active devices directly integrated with the antennas, are important in radar and communication applications. Chapter 11 discusses some of these types of antennas, and presents some samples, including integration with amplifiers, oscillators, and active microstrip-antenna frequency converters.

The final chapter deals with microstrip arrays, and includes various architectures and feeding configurations. Traveling-wave linear arrays of printed dipoles, both finite and infinite, are described. Some design considerations are touched on.

The book provides a well-balanced and excellent resource for understanding the basics of microstrip antennas. It offers in-depth information, as well as a comprehensive list of references on the latest developments. It will be very useful for microstrip-antenna researchers and designers.

Reviewed by:

Yahia M. M. Antar
Canada Research Chair in Electromagnetic Engineering
Electrical and Computer Engineering Department
Royal Military College of Canada
Tel: +1 (613) 541-6000, Ext. 6403
Fax: +1 (613) 544-8107
E-mail: antar-y@rmc.ca