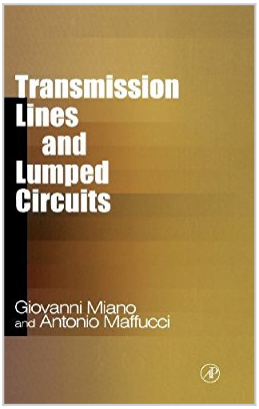

Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism)

By Giovanni Miano, Antonio Maffucci

Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism) By Giovanni Miano, Antonio Maffucci

The theory of transmission lines is a classical topic of electrical engineering. Recently this topic has received renewed attention and has been a focus of considerable research. This is because the transmisson line theory has found new and important applications in the area of high-speed VLSI interconnects, while it has retained its significance in the area of power transmission. In many applications, transmission lines are connected to nonlinear circuits. For instance, interconnects of high-speed VLSI chips can be modelled as transmission lines loaded with nonlinear elements. These nonlinearities may lead to many new effects such as instability, chaos, generation of higher order harmonics, etc. The mathematical models of transmission lines with nonlinear loads consist of the linear partial differential equations describing the current and voltage dynamics along the lines together with the nonlinear boundary conditions imposed by the nonlinear loads connected to the lines. These nonlinear boundary conditions make the mathematical treatment very difficult. For this reason, the analysis of transmission lines with nonlinear loads has not been addressed adequately in the existing literature. The unique and distinct feature of the proposed book is that it will present systematic, comprehensive, and in-depth analysis of transmission lines with nonlinear loads.

- A unified approach for the analysis of networks composed of distributed and lumped circuits
- A simple, concise and completely general way to present the wave propagation on transmission lines, including a thorough study of the line equations in characteristic form
- Frequency and time domain multiport representations of any linear transmission line
- A detailed analysis of the influence on the line characterization of the frequency and space dependence of the line parameters
- A rigorous study of the properties of the analytical and numerical solutions of the network equations
- The associated discrete circuits and the associated resisitive circuits of transmission lines

- Periodic solutions, bifurcations and chaos in transmission lines connected to noninear lumped circuits

Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism)

By Giovanni Miano, Antonio Maffucci

Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism) By Giovanni Miano, Antonio Maffucci

The theory of transmission lines is a classical topic of electrical engineering. Recently this topic has received renewed attention and has been a focus of considerable research. This is because the transmisson line theory has found new and important applications in the area of high-speed VLSI interconnects, while it has retained its significance in the area of power transmission. In many applications, transmission lines are connected to nonlinear circuits. For instance, interconnects of high-speed VLSI chips can be modelled as transmission lines loaded with nonlinear elements. These nonlinearities may lead to many new effects such as instability, chaos, generation of higher order harmonics, etc. The mathematical models of transmission lines with nonlinear loads consist of the linear partial differential equations describing the current and voltage dynamics along the lines together with the nonlinear boundary conditions imposed by the nonlinear loads connected to the lines. These nonlinear boundary conditions make the mathematical treatment very difficult. For this reason, the analysis of transmission lines with nonlinear loads has not been addressed adequately in the existing literature. The unique and distinct feature of the proposed book is that it will present systematic, comprehensive, and in-depth analysis of transmission lines with nonlinear loads.

- A unified approach for the analysis of networks composed of distributed and lumped circuits
- A simple, concise and completely general way to present the wave propagation on transmission lines, including a thorough study of the line equations in characteristic form
- Frequency and time domain multiport representations of any linear transmission line
- A detailed analysis of the influence on the line characterization of the frequency and space dependence of the line parameters
- A rigorous study of the properties of the analytical and numerical solutions of the network equations
- The associated discrete circuits and the associated resisitive circuits of transmission lines
- Periodic solutions, bifurcations and chaos in transmission lines connected to noninear lumped circuits

Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism) By Giovanni Miano, Antonio Maffucci Bibliography

- Rank: #3984356 in eBooks
- Published on: 2001-02-23
- Released on: 2001-02-23
- Format: Kindle eBook

Editorial Review

From the Back Cover
The time-domain analysis of networks composed of linear transmission lines and nonlinear and/or time-varying lumped circuits is at the basis of design and verification of modern high-speed electronic circuits and large power distribution systems.

This book provides an in-depth and comprehensive study of time-domain models of these networks.

The theory of wave propagation on linear transmission lines is presented with an unified approach, that is applicable to any kind of line: two-conductor or multiconductor, lossless or lossy, uniform or nonuniform, with parameters depending or not on frequency.

A general method is described to characterize the terminal behavior of transmission lines, and to obtain equivalent circuit representations, both in the frequency and in the time domain.

Unique feature of this book is the extension of fundamental concepts of the lumped circuit theory, such as those of associated discrete circuit and of associated resistive circuit, to networks of transmission lines and lumped circuits.
The well-posedness of the network equations and their numerical approximations is deeply investigated by using these concepts.

Fascinating phenomena such as periodic solutions, bifurcations and chaos are observed in transmission lines connected to nonlinear active elements.

Key Features
· A simple, concise and completely general way to present the wave propagation on transmission lines, including a thorough study of the line equations in characteristic form.
· Frequency and time domain characterization of the terminal behavior of any linear transmission line.
· A unified approach for the analysis of networks composed of distributed and lumped circuits.
· Bifurcations and chaos in transmission lines.

Benefits
The book is intended as a reference in advanced courses of Circuit Theory and Design, Electromagnetism, Electromagnetic Compatibility, and as a guide for researchers and industrial professionals involved in the computer-aided design of electrical and electronic networks.

The students will find here a simple but rigorous explanation of wave propagation along transmission lines, a completely general method to characterize the terminal behavior of the lines both in frequency and time domain, and a unified approach to study networks composed of distributed and lumped circuits.

The researchers and professionals will appreciate the time domain modeling of distributed circuits, providing simple equivalent circuit representations, ready to be implemented in SPICE-like circuit simulators, for the analysis of large networks.
This book will be of interest to a broad audience of engineers and researchers involved in electromagnetic

analysis, design of VLSI circuits, power systems, and CAD software development.

About the Author
Antonio Maffucci is Associate Professor of Electrical Engineering at the University of Cassino and Southern Lazio. Since 2014, he has also been associated to the INFN, Frascati National Laboratories. His research focuses on issues of electromagnetic and circuit modeling, computational electromagnetics, electromagnetic compatibility, nanotechnology. He is the author of 160 international publications, 3 reviews, 1 book, 7 book chapters and 4 receiverships.

From the Introduction:

Due to the rapid increase in signal speed and advances in electronic circuit technology, interconnections between electronic devices may behave as transmission lines. Unintentional delays, crosstalk voltages, reflections, signal losses, and voltage overshoots on terminal devices affect the correct operation of high-speed electronic circuits (e.g., Paul, 1992). "To meet the challenges of high-speed digital processing, today’s multilayer printed circuit boards must: a) reduce propagation delay between devices; b) manage transmission line reflections and crosstalk (signal integrity); c) reduce signal losses; d) allow for high density interconnections" (Montrose, 1998). Crosstalk, delays and multireflections are also important phenomena in on-chip interconnections for high-performance microprocessors (e.g., Deutsch et al., 1995, 1997; Motorola Inc., 1989). Therefore, for design and verification of these circuits, accurate and efficient simulation techniques are needed. As most electronic devices are time-varying and nonlinear, the analysis of these systems and hence of the transmission lines themselves, must be performed in the time domain.

The analysis of transmission lines in the time domain is also important for power systems to predict the transient behavior of long power lines either excited by external electromagnetic fields, for example, emission of high-power radars, nuclear electromagnetic pulses, lightning strokes, or under disruptions such as short circuits at some places (e.g., Paul, 1992).

This book concerns the time domain analysis of electrical networks composed of transmission lines and lumped circuits. The time domain analysis of lumped circuits is a fundamental and well-understood subject in electrical engineering. Nevertheless, the time domain analysis of networks composed of transmission lines and lumped circuits, and of the transmission lines themselves, are not so well understood.

The primary purposes of this book are threefold.

First, the theory of wave propagation in transmission lines, whether two-conductor or multiconductor, lossless or with losses, with parameters depending or not on the frequency, uniform or nonuniform, is presented in a way that is new, completely general, and yet concise.

The second objective is to give an original and general method to characterize the terminal behavior of transmission lines in both the frequency and time domains. A characterization of the lines dealing exclusively with the voltages and currents at their ends is a prerequisite to tackling the study of networks composed of transmission lines and lumped circuits through all those techniques of analysis typical of lumped circuit theory.

The last objective, but not the least, is the qualitative study of the equations relevant to networks composed of transmission lines and lumped circuits. A unique feature of this book is the extension of some of the concepts of lumped circuit theory, such as those of associated discrete circuit (Chua and Lin, 1975) and associated resistive circuit (Hasler and Neirynck, 1986), to networks composed of lumped and distributed elements.

Whether the transmission line model accurately describes actual interconnections or not is a basic question that is beyond the scope of this text. The reader is assumed to be acquainted with it. Here we only recall that, under the assumption of a quasi-transverse electromagnetic (quasi-TEM) mode of propagation, interconnections may be modeled as transmission lines (e.g., Lindell and Gu, 1987; Collin, 1992; Paul, 1994). Whether this assumption is satisfied or not for actual interconnections depends on the frequency spectrum of the signals propagating along them, on their cross-sectional dimensions, and on the electromagnetic properties of the conductors and the medium embedding them. In most cases of interest a simple criterion is the following. The distance between the conductors must be much smaller than the lowest characteristic wavelength of the signals propagating along them.

The first chapter of this book is devoted to the transmission line model. First, we shall recall some of the basic aspects of the quasi-TEM approximation and the equations of the transmission lines. Then, we shall examine closely some general properties of the transmission line equations that are of considerable importance and that we shall be using widely in this book.

Users Review

From reader reviews:

Molly Cooper:

Book is actually written, printed, or descriptive for everything. You can learn everything you want by a book. Book has a different type. As it is known to us that book is important factor to bring us around the world. Beside that you can your reading expertise was fluently. A guide Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism) will make you to always be smarter. You can feel more confidence if you can know about every little thing. But some of you think that open or reading a book make you bored. It is not make you fun. Why they may be thought like that? Have you seeking best book or ideal book with you?

James Drake:

People live in this new time of lifestyle always attempt to and must have the extra time or they will get lot of stress from both everyday life and work. So , if we ask do people have time, we will say absolutely yes. People is human not just a robot. Then we request again, what kind of activity are you experiencing when the spare time coming to an individual of course your answer may unlimited right. Then do you try this one, reading guides. It can be your alternative with spending your spare time, the book you have read is definitely Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism).

Dwight Bailey:

Are you kind of occupied person, only have 10 as well as 15 minute in your moment to upgrading your mind proficiency or thinking skill possibly analytical thinking? Then you are having problem with the book compared to can satisfy your small amount of time to read it because this all time you only find e-book that need more time to be read. Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism) can be your answer given it can be read by an individual who have those short time problems.

Allen Green:

Reading a guide make you to get more knowledge as a result. You can take knowledge and information from your book. Book is created or printed or outlined from each source in which filled update of news. Within this modern era like today, many ways to get information are available for an individual. From media social just like newspaper, magazines, science guide, encyclopedia, reference book, fresh and comic. You can add your understanding by that book. Isn't it time to spend your spare time to open your book? Or just looking for the Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism) when you essential it?

Read Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism) By Giovanni Miano, Antonio Maffucci for online ebook

Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism) By Giovanni Miano, Antonio Maffucci Free PDF d0wnl0ad, audio books, books to read, good books to read, cheap books, good books, online books, books online, book reviews epub, read books online, books to read online, online library, greatbooks to read, PDF best books to read, top books to read Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism) By Giovanni Miano, Antonio Maffucci books to read online.

Online Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism) By Giovanni Miano, Antonio Maffucci ebook PDF download

Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism) By Giovanni Miano, Antonio Maffucci Doc

Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism) By Giovanni Miano, Antonio Maffucci Mobipocket

Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism) By Giovanni Miano, Antonio Maffucci EPub

OBA43RQ8Z59: Transmission Lines and Lumped Circuits: Fundamentals and Applications (Electromagnetism) By Giovanni Miano, Antonio Maffucci