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New publication: **Balanced Microwave Filters**



The book *Balanced Microwave Filters* presents the recent progress of the international research community on balanced microwave filters and circuits, key components in modern telecommunication systems. The book, co-edited by Ferran Martín, Professor of the *Departament d'Enginyeria Electrònica* at *Universitat Autònoma de Barcelona* (UAB), has been published by Wiley-IEEE Press.

Differential, or balanced, transmission lines and circuits have been traditionally applied to low-frequency analog systems and to high-speed digital systems. As compared with single-ended signals, differential-mode signals exhibit lower electromagnetic interference (EMI) and higher immunity to electromagnetic noise and crosstalk. Consequently, a better signal integrity and a higher signal-to-noise ratio (SNR) can be achieved in differential systems. These aspects are especially critical in modern digital systems, where logic signal swing and noise margin have dramatically decreased and hence are less immune to the effects of noise and EMI. However, differential systems are implemented through balanced circuits and transmission lines (interconnects), representing further design and fabrication complexity as compared with single-ended systems. For this main reason, in radiofrequency (RF) and microwave applications, unbalanced structures have dominated the designs for decades, still being more common than differential circuits. Nevertheless, recent technological advances are pushing differential circuits into the RF and microwave frequency domain, and balanced lines and devices are becoming

increasingly common not only in high-speed digital circuits but also in modern communication systems.

Within this context, the book focuses on key components in communication systems, i.e., balanced filters. A detailed analysis of the most common filter topologies, including narrow-band, wide-band and multi-band implementations, is carried out. The main aim is the inherent suppression of the so-called common-mode noise, which is the source of most of the radiation and EMI problems in differential systems, and may degrade the desired differential signals. Moreover, other balanced circuits, such as diplexers, power dividers/combiners, and equalizers, are also included in the book. Many different design strategies, based on symmetry properties, for the implementation of differential filters and circuits, are discussed, including coupled transmission line sections, multilayer structures, slot-based structures, substrate integrated waveguides, metamaterials, signal interference, techniques, etc.

The book, co-edited by Ferran Martín, Lei Zhu, Jiasheng Hong and Francisco Medina, IEEE Fellows, is also co-authored by the top international researchers in the field. The book can be of practical use to students, researchers, and engineers involved in the design/optimization of RF/microwave components and filters.

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References

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