

Preface

Driven by the science and technology revolution, technologies such as wireless communication, computer, deep-space exploration and bioengineering are developing at an unprecedented speed. Above all, the rise of wireless communication technology not only has a very profound impact on science and technology, but also accelerates a series of revolutions in the realm of politics, economics and culture. More importantly, it enables our communication to be free from space restraint, makes our vision extended to the vast universe, makes economic globalization possible and greatly boosts informatization and networking in the military domain, a key enabler for Network-Centric Warfare. Needless to say, wireless communication technology is infiltrating at an unstoppable speed into every aspect and every corner of the world.

Wireless communication makes use of the characteristics of electromagnetic waves propagating in space freely to exchange information remotely. The antenna is designed as the portal of the wireless communication, whose task is converting high-frequency current to electromagnetic waves, and vice versa; thus, different electromagnetic waves can be transmitted or received by antenna. The antenna performance has a direct impact on the efficiency of the wireless communication system. Therefore, the development of antenna technology plays a critical role in the development of wireless communication.

As we all know, an electromagnetic wave radiated by any antenna is an elliptical polarization wave, and its extreme case is a linear polarized wave or a circular polarized wave. However, linear polarized wave is vulnerable to many factors, such as climate, environment and carrier movement, which would cause polarization deflection loss or even failure; and although circular polarized wave suffers less polarization deflection loss, it will suffer polarization reversal when it encounters a reflector. Therefore, in the field of wireless communication, especially satellite communication, circular polarized wave is usually used to counter electromagnetic wave interference caused by many factors, such as rain, fog, ionosphere and multi-path effects. Therefore, the circularly polarized antenna is a very important member in the antenna family, and it is widely used in radar, remote sensing, communication, military application and other aspects.

However, circularly polarized antennae of wireless communication systems are facing more and more stringent requirements, and there are challenges due to miniaturization, high gain and their wideband nature. Fortunately, scholars worldwide are working tirelessly in the field of circularly polarized antennae and have developed a series of new circularly polarized antenna technologies, including dual-band, dual-circular polarization antenna technology, wideband circular polarization antenna technology, wide beam circular polarization antenna array technology, and so on. There are various literatures on new technologies for circularly polarized antennae. However, they are not general solutions for all kinds circularly polarized antennae; instead there are key technologies for different problems. Therefore, these new technologies need to be categorized so as to lay a solid foundation for the development of circularly polarized antenna

technology, and that is why this book *Circularly Polarized Antenna Technology* is compiled by the 36th Research Institute of China Electronic Technology Group Corporation.

The authors of this book are senior engineers who have been working in the field of antennae for years, and they are very experienced in both theory and practical design. This book is very clear in context, integrating theory with practice and is easy to understand; therefore, it is ideal for engineers, college senior undergraduates, graduate students and young teachers engaged in circularly polarized antenna research. I firmly believe this book will be of great help to circular polarization antenna designers and will be welcomed and applauded by readers.

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