Preface

When the first volume of the *Ultra-Wideband, Short-Pulse Electromagnetics* book series was published in 1993, the terms ultra-wideband (UWB) and short pulse (SP) were acronyms for challenging technologies. In 1992, the DARPA Ultra-Wideband Radar Review Panel defined UWB by the need for special techniques to overcome challenging problems facing conventional systems and technologies when attempting to operate over a broad range of frequencies.

Since then notable progress in UWB and SP technologies has been achieved. As a result, wideband systems are now being used for an increasingly wide variety of applications. UWB radar systems are used for collision avoidance, concealed object detection, mine detection, and oil pipeline inspections. In the communication area, the need for increasing bandwidth boosted the development of UWB communication systems including the impulse radio. Many high-power electromagnetic (HPEM) environments are generated, employing short-pulse technology. With the advent of HPEM sources capable of interrupting and/or damaging sensitive electronics, there has been an increasing interest in protecting critical infrastructure and systems. Recently, the literature has reported the usage of SP techniques in microwave tomography systems for biomedical applications.

Through the whole development of UWB and SP technologies, the *Ultra-Wideband, Short-Pulse Electromagnetics* series of books provided new and state-of-the-art information on the tendencies and current achievements in UWB- and SP-related technologies, analyzing methodologies, theoretical models, and time domain data processing. The objectives of the *Ultra-Wideband, Short-Pulse Electromagnetics* book series are:

- To focus on advanced technologies for the generation, radiation, and detection of UWB and SP signals
- To report on developments in supporting mathematical and numerical methods, which are capable of analyzing the propagation of UWB and SP signals as well as their scattering from and coupling to targets and media of interest
- To describe current and potential future applications of the UWB and SP technology
“Ultra-Wideband, Short-Pulse Electromagnetics 10” (UWB SP 10) contains articles which present recent developments in the areas UWB and SP technology, components, application, numerical analysis, modeling, and electromagnetic theory. The initial set of contributions was selected from presentations at the UWB SP 10 and UWB SP 11 conferences that were held in conjunction with AMEREM 2010 in Ottawa (ON), Canada, and EUROEM 2012 in Toulouse, France. The goal of the volume editors was to cover the complete range of aforementioned topics with articles of deep technical content and high scientific quality. Where we felt that there were gaps in coverage, selected authors were invited to contribute additional articles to complete the overall picture. Therefore, we hope that this book contains something of interest for every scientist and engineer working in the area of ultra-wideband and short-pulse electromagnetics.

With a slight variation on a tradition in the Ultra-Wideband, Short-Pulse Electromagnetics (UWB SP) series, particularly those which are related to EUROEM conferences, a frontispiece displays the picture of a renowned scientist. In the opinion of the editorial board, the title of the UWB SP 9 book completed the series consisting of Maxwell, Hertz, and Einstein.

Therefore, we decided to use the frontispiece of UWB SP 10 to start a new series. In important respects, this volume is special. It establishes ties between North America and Europe as it contains contributions from both AMEREM 2010 and EUROEM 2012. A human tie between both the AMEREM and EUROEM series was Carl E. Baum, who passed away in December 2010. AMEREM 2010 was the last conference of this series that he attended, and EUROEM 2012 took place without Carl in the audience or delivering numerous presentations.

The frontispiece of this UWB SP 10 book displays a picture of Carl Baum during his acceptance speech of the honorary doctoral degree from the Otto-von-Guericke University in Magdeburg. This 10th volume in our series honors Carl, a remarkably creative engineer who introduced innumerable new concepts in mathematics, electromagnetic theory, and system design, many of which remain the standards of excellence today. From his earliest designs in electromagnetic pulse sensors and simulators to the latest developments in high-power microwave and ultra-wideband antenna and system design, his research has remained at the forefront of technology.

Finally, I would like to express my gratitude to all persons who contributed to this book. In particular, I thank the authors for writing articles of deep technical content and high scientific quality and the members of the review board who helped to improve the quality of this book.

Munster, Germany
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Editor-in-Chief
Ultra-Wideband, Short-Pulse Electromagnetics 10
Sabath, F.; Mokole, E.L. (Eds.)
2014, XXXIII, 496 p. 330 illus., 237 illus. in color.,
Hardcover
ISBN: 978-1-4614-9499-7