Ultra-Wideband, Short-Pulse Electromagnetics 7
Edited by Frank Sabath, Eric L. Mokole, Uwe Schenk and Daniel Nitsch

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Springer
Reality is evenly... only a quite special, narrow segment from the immeasurable range that thoughts are able to encompass.

(Original: Die Wirklichkeit ist eben ... nur ein ganz spezieller, schmaler Ausschnitt aus dem unermesslichen Bereich dessen, was die Gedanken zu umspannen vermögen.)

Max Planck

The question on nature is not answered now, but the intellect which is no longer afflicted stops asking the question that it is incapable of answering/unqualified to answer.

(Original: Es ist nun zwar nicht die Frage nach dem Wesen beantwortet, aber der nicht mehr gequälte Geist hört auf, die für ihn unberechtigte Frage zu stellen.)

Heinrich Hertz
Ultra-wideband (UWB), short-pulse (SP) electromagnetics as a subject has been of interest for decades. Notable progress in UWB and SP technologies has been achieved by investigations of their theoretical bases and improvements in solid-state manufacturing, computers, and digitizers. As a result, wideband systems that were difficult or impossible to field 10 years ago are now being used for an increasingly wide variety of applications, including collision avoidance radar, concealed object detection, and communications. UWB radar systems are also being used for mine clearing, oil pipeline inspections, archeology, geology, and electronic effects testing.

Bertoni, Carin, and Felsen initiated the first UWB–SP Electromagnetics Conference in 1992 to weave a responsive cord throughout the electromagnetics community. Since then, UWB-SP conferences have been events that discussed current developments in UWB–SP technologies and systems and that placed special emphasis on UWB-SP methodologies, time-domain data processing, and time-domain modeling.

The goals of the most recent meetings were:

- to focus on advanced technologies for the generation, radiation, and detection of UWB–SP signals, taking into account their propagation about, scattering from, and coupling to targets and media of interest;
- to report on developments in supporting mathematical and numerical methods;
- to describe current and potential future applications of the technology.

The session topics of UWB-SP7 included electromagnetic theory, scattering, UWB antennas, UWB systems, ground penetrating radar (GPR), UWB communications, pulsed-power generation, time-domain computational electromagnetics, UWB compatibility, target detection and discrimination, propagation through dispersive media, and wavelet and multi-resolution techniques.

This book presents selected contributions of the UWB–SP7 Conference that was held in conjunction with the EUROEM 2004 in Magdeburg, Germany, in July of 2004. The editorial board’s goal is to cover the complete range of aforementioned topics with articles of deep technical content and high scientific quality. The final selection of articles is organized by the topics of antennas, electromagnetic theory and modeling, time-domain computational techniques, pulsed-power, UWB interactions, UWB and transient metrology, radar systems, detection, target identification and signal processing, UWB communications, and broadband systems and components. We hope the book contains something of interest for every scientist and engineer working in the area of UWB and SP electromagnetics.
In keeping with the themes of UWB–SP7, a picture\(^1\) of Heinrich Hertz is displayed on the cover of this volume to honor his contributions to electromagnetics as the first scientist to demonstrate the existence of electromagnetic radiation by building an apparatus that produced radio waves. Finally, the editorial board would like to express its gratitude to all persons who contributed to this book.

Frank Sabath  
Eric L. Mokole  
Uwe Schenk  
Daniel Nitsch

\(^1\) The source of the picture is Internet & eCommerce Online Lexicon at http://www.atm-mix.de.
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