Preface

On May 16th 2007 the Faculty of Electrical Engineering and Information Technology of the Technische Universität München bestowed the degree of the doctor honoris causa to Wolfgang J.R. Hoefer for Extraordinary achievements in the theory of electromagnetic fields. On this special occasion a symposium on Time Domain Methods in Modern Engineering Electrodynamics has been held in honor of Professor Wolfgang J.R. Hoefer at the Technische Universität München on May 16 and 17, 2007. The symposium topic was focused on the main area of research of Wolfgang J.R. Hoefer, the time domain methods in computational electromagnetics especially the transmission line matrix method and its applications. The transmission line matrix method has been developed and first published by Johns and Beurle in 1971. In the past 20 years Wolfgang Hoefer has given exemplary contributions to the development of the transmission line method.

Space and time discretizing time domain methods have emerged as key numerical methods in computational electromagnetics. Time domain methods are versatile and can be applied to the solution of wide range of electromagnetic field problems. Computing the response of an electromagnetic structure to an impulsive excitation localized in space and time provides a comprehensive characterization of the electromagnetic properties of the structure in a wide frequency range. The most important methods are the finite difference time domain and the transmission line matrix methods. Whereas finite difference methods are based on the transition from differentials in the Maxwells Equations to finite differences, the transmission line matrix (TLM) method is based on the representation of the discretized electromagnetic by wave pulses propagating in a three-dimensional mesh of transmission lines. The space is discretized by subdivision into cells and the electromagnetic field is modeled by wave pulses propagating between adjacent cells and scattered within the cells. The TLM algorithm is based on the modeling of the propagation of wave pulses through a mesh of transmission lines and the scattering of the wave pulses and in mesh nodes. The simulation of the reaction to a single impulsive electromagnetic excitation yields a large amount information. The versatility of the TLM methods allows straightforward calculation of complex electromagnetic structures. With the computational power of today's computers, this method is a powerful tool for the computer-aided design of complex electromagnetic structures.

The symposium has given the opportunity to colleagues and students of Wolfgang J.R. Hoefer to present their recent advances in the field of time domain electromagnetics

and its applications. This book contains extended versions of most of the scientific contributions of the symposium. The arrangement of the contributions in five chapters corresponds to the allocation of the presented material into five sessions.

1. Time-Domain Methods for Electromagnetic Field Modelling
2. The Transmission-Line-Matrix Method
3. Circuit Concepts and Methods
4. Antenna and Ultrawideband System Design
5. Novel Devices and Systems

The first chapter deals with time-domain methods for electromagnetic modeling in general. The second chapter focuses on the TLM method. The third chapter is dedicated to network concepts applied to electromagnetic field modeling. The fourth chapter is dedicated to circuit and system applications, and the fifth chapter dels with broadband devices, systems and measurement techniques.

The honorary doctor degree bestowal ceremony took place in the morning of 16 May 2007. In the beginning of the bestowal ceremony addresses of Professor Ulrich Wagner, the dean on the Faculty of Electrical Engineering and Information Technology of the Technische Universitt Mnchen, and Professor Wolfgang A. Hermann, the president of the Technische Universitt Mnchen were given. After this Professor Peter Russer held the laudatio. This was follwed by the bestowal and the lectio of Wolfgang J.R. Hoefer.

Munich, *Peter Russer*
December 2007 *Uwe Siart*

http://www.springer.com/978-3-540-68766-5

Time Domain Methods in Electrodynamics
A Tribute to Wolfgang J. R. Hoefer
Russer, P.; Siart, U. (Eds.)
2008, XXI, 417 p., Hardcover
ISBN: 978-3-540-68766-5