Computer Aided Design of Wire Structures

Frequency and Time Domain Analysis

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Published by

WIT Press
Ashurst Lodge, Ashurst, Southampton, SO40 7AA, UK
Tel: 44 (0) 238 029 3223; Fax: 44 (0) 238 029 2853
E-Mail: witpress@witpress.com
http://www.witpress.com

For USA, Canada and Mexico

WIT Press
25 Bridge Street, Billerica, MA 01821, USA
Tel: 978 667 5841; Fax: 978 667 7582
E-Mail: infousa@witpress.com
http://www.witpress.com

British Library Cataloguing-in-Publication Data

A Catalogue record for this book is available
from the British Library

ISBN: 978-1-85312-884-4
ISSN: 1463-0451

LOC: 2006938302

Printed in Great Britain by Athenaeum Press Ltd., Gateshead.

Dedication

To our beloved ones.

Our knowledge can only be finite, while our ignorance must necessarily be infinite.
Karl Popper

It's better to burn out than fade away.
Neil Young

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CHAPTER 3

Preface

Modelling of radiation and scattering from arrays composed from straight thin wires is a very important topic, not only in antenna theory and applications, but also in many electromagnetic compatibility (EMC) related applications. This book accompanied with related TWiNS (Thin Wire Numerical Solver) software package is an extension of the previous book by D. Poljak devoted to the analysis of thin wires in frequency and time domain via integral equation approach entitled: *Electromagnetic Modelling of Wire Antenna Structures*.

That book, written more than five years ago, featured a particular variant of the Galerkin Bubnov Indirect Boundary Element Method (GB-IBEM) in both the frequency and time domain, originally developed by D. Poljak, (entitled as the Finite Element Integral Equation Method – FEIEM). The *Electromagnetic Modelling...* book has dealt with simple geometries (single straight wire, curved wire and two coupled wires in an inhomogeneous medium) and has been accompanied with the TAWS (Transient Analysis of Wire Structures) code for handling the two-wire array in a two media configuration in the time domain.

The present book entitled: *Computer Aided Design of Wire Structures*, extending the issue of the previous book, deals with an analysis of thin wire arrays in the frequency and time domain via TWiNS code. Using this code enables one to calculate corresponding current distribution, near and far field, radiation pattern and input impedance.

The book is divided into two parts. The first part is concerned with the theoretical background and the frequency and the time domain numerical modelling procedures for thin wire arrays on which the TWiNS code has been based. Frequency and time domain GB-IBEM procedures implemented in the TWiNS code are presented in detail. Many illustrative computational examples, pertaining not only to academic, but also to some real world problems are also enclosed.

The second part of the book is devoted to the description of the TWiNS code and contains the complete user manual with some worked examples related to the frequency and time domain examples of wire arrays.

We hope that the reader will find useful the presented theory and accompanied software package in analyzing and resolving his/her own problems related to antennas or some EMC problems. This book and developed software stem from years of

continuing work in the area of wire antennas and related EMC applications, not only by ourselves, but also by some of our colleagues. The software we have produced should be regarded as a key-stone to the future software packages to be developed. Those packages will implement much sophisticated user interface and will be dealing with more complex wire structures thus enabling analysis and solutions for manifold problems in electromagnetics.

The Authors
Split, 2007