

## Preface

This book contains papers presented at the International Symposium on Electromagnetic Fields in Mechatronics, Electrical and Electronic Engineering ISEF'07 which was held in Prague, the Czech Republic, from September 13 to 15, 2007. ISEF conferences have been organized since 1985 and from the very beginning it was a common initiative of Polish and other European researchers who have dealt with electromagnetic field in electrical engineering. The conference travels through Europe and is organized in various academic centres. Relatively often, it was held in some Polish city as the initiative was on the part of Polish scientists. Now ISEF is much more international and successive events take place in different European academic centres renowned for electromagnetic research. This time it was Prague, famous for its beauty and historical background, as it is the place where many cultures mingle. The venue of the conference was the historical building of Charles University, placed just in the centre of Prague. The Technical University of Prague, in turn, constituted the logistic centre of the conference.

It is the tradition of the ISEF meetings that they try to tackle quite a vast area of computational and applied electromagnetics. Moreover, the ISEF symposia aim at combining theory and practice; therefore the majority of papers are deeply rooted in engineering problems, being simultaneously of a high theoretical level. The profile of the conference changes, however, year-by-year and one can find more and more contributions dealing with applied electromagnetics coupled with hardware and software technologies. That is why, for the first time, the organizers decided to use the Springer Lecture Notes in Artificial Intelligence as the proper place for publishing some of the papers. Generally speaking, one can observe the trend of a decreasing number of papers which deal with classical electrical engineering in preference to information technology and biomedical applications. This direction seems to be comprehensible in the light of modern industry. Nevertheless, even beyond electrical engineering, we do touch the heart of the matter in electromagnetism.

The ISEF'07 Proceedings cover over 240 papers and after a selection process, 24 papers were accepted for publication in this volume, while the others were directed to COMPEL: The International Journal for Computation and Mathematics in Electrical and Electronic Engineering and to another book to be published by IOS Press.

The methods of evaluation and control of the electromagnetic field, based on Artificial Intelligence (AI), constitute the core of the papers presented at the ISEF'07 conference. Indeed, nowadays it would be hard to imagine dealing with electromagnetic field analysis without computer simulation. The papers which have been selected for this volume have strong links with AI theory and methodology, i.e. they do not use the numerical method automatically but they attempt to contribute some new AI tools to computer modelling. We hope that such an approach would be developed further in future ISEF conferences.

The papers selected for this volume have been grouped into three parts, which represent the following topics:

- Algorithms and Intelligent Computer Methods
- Computer Methods and Engineering Software
- Applications of Computer Methods

The first part consists of papers dealing with the algorithms which are more general and concern the class of more general problems, like the problems of optimization and/or inverse problems. Thus, the first part is focused on information techniques rather than modelling particular devices. The reader may find here such problems as multi-agent algorithms, neural networks, genetic algorithms, wavelet transformation, paralleling of computation problems, monitoring and others.

The second part directs the reader's attention to similar problems but referring to more technical aspects. Indeed, one can find here the papers which deal with numerical modelling of such devices as high voltage power lines, actuators, NMR and induction tomography, adaptive plasma, electrochemical machining and others. It is clearly seen that the attention here is focused on the device rather than the methodology.

The third part consists of papers dealing with the application of advanced algorithms and methods to selected technical engineering problems. The reader can focus attention on such problems as **optimization of a drive system, combined electromagnetic and thermal analysis by means of approximate methods**, combined finite element method (FEM) and finite volume method (FVM), algorithms based on stochastic methods and others.

At the end of these remarks let us, the Editors of the volume, be allowed to express our thanks to our colleagues who have contributed to the book by peer-reviewing the papers at the conference as well as in the publishing process. We also convey our thanks to Springer-Verlag Publisher for their effective collaboration in shaping this editorial enterprise. As ISEF conferences are organised biannually we do hope to maintain our strong links with Springer-Verlag Publisher in the future.

Poland  
Poland  
Czech Republic  
May, 2008

*Sławomir Wiak*  
*Andrzej Krawczyk*  
*Ivo Dolezel*

Intelligent Computer Techniques in Applied  
Electromagnetics

Wiak, S.; Krawczyk, A.; Dolezel, I. (Eds.)

2008, X, 304 p. 201 illus., Hardcover

ISBN: 978-3-540-78489-0