Volume 31, Number 6 November–December 2018

International Journal of Numerical Modelling

Electronic Networks, Devices and Fields

Special Issue: Advances in EMC Numerical Modelling

Guest Editor:
Guido Ala

Editor-in-Chief
Eric Michielssen

ISSN 0894-3370
View this journal online at wileyonlinelibrary.com

WILEY

International Journal of

Numerical Modelling

Electronic Networks, Devices and Fields

AIMS AND SCOPE

Prediction through modelling forms the basis of engineering design. The computational power at the fingertips of the professional engineer is increasing enormously and techniques for computer simulation are changing rapidly. Engineers need models which relate to their design area and which are adaptable to new design concepts. They also need efficient and friendly ways of presenting, viewing and transmitting the data associated with their models.

The *International Journal of Numerical Modelling: Electronic Networks, Devices and Fields* provides a communication vehicle for numerical modelling methods and data preparation methods associated with electrical and electronic circuits and fields. It concentrates on numerical modelling rather than abstract numerical mathematics.

Contributions on numerical modelling will cover the entire subject of electrical and electronic engineering. They will range from electrical distribution networks to integrated circuits on VLSI design, and from static electric and magnetic fields through microwaves to optical design. They will also include the use of electrical networks as a modelling medium.

PRINCIPAL TOPICS

- Electromagnetic field modelling from d.c. to optical frequencies
- Modelling of information networks, analogue and digital circuits, power distribution
- Modelling of solid state devices, electronic tubes, electrical components
- Moving boundary problems, coupled problems
- Network modelling, energy and moment methods, element and ray methods, graphs
- Pre- and post-processing of data

In order to maintain the Journal's high standards, papers will be sent to at least two referees for peer review, and in the event of disagreement will be sent to a third reviewer—usually a member of the Editorial Board—for arbitration.

COPYRIGHT AND COPYING

DISCLAIMER

DATA PROTECTION

DOI: 10.1002/jnm.2468

GUEST EDITORIAL

WILEY

Special issue on advances in EMC numerical modelling

The pervasive use of electronic sensing, communication, and actuation technologies in all aspects of human life has increased the need for a clear and complete picture of the electromagnetic environment and of the interferences that may occur in our ever more complex and interconnected world. Numerical modeling and simulation play a key role in the design of electromagnetic systems, and new algorithms and computational capabilities are increasingly essential to comprehensively tackle EMC issues across physical and temporal scales. The aim of this special issue is to provide the reader of the International Journal of Numerical Modeling: Electronic Networks, Devices and Fields with a glance into the state-of-the-art, challenges, and future prospectives in EMC numerical modeling.

This issue contains a selection of seven manuscripts. Two papers by *D. Romano, L. Lombardi*, and *G. Antonini* present a novel technique to speed-up the computation of partial elements describing magnetic and electric field coupling in the framework of the Partial Element Equivalent Circuit (PEEC) method for 3-D simulation; in particular, the papers address the problem of calculating the volume and surface integrals required to fill the PEEC matrices: these calculation can be accelerated by an efficient identification of the repeated configurations used for 3-D geometries tessellation. The computations take advantage also from the slow change with frequency of the integrals, which can be interpolated over a reduced number of coefficients that are evaluated in a vectorialized manner. The paper by *A. Shourvarzi* and *M. Joodaki* deals with shielding effectiveness optimization of an enclosure loaded with arbitrarily shaped apertures by using a network of ports. This approach benefits from S-parameter analysis and circuit theory for the description of the shielding. The proposed method has no dimensional limits and no need for antennas, shielded rooms, or reverberation chambers.

The invited paper by *J. Becerra*, *J. Vega* and *F. Rachidi* presents a method for obtaining stable time marching equations of distributed multiport networks with non-linear loads. One of the benefits of the method with respect to other stable time marching methods is a great decrease of the sampling requirement. The stability of the approach is analyzed and ensured in the Z-domain. *R. Araneo*, *G. Lovat*, *P. Burghignoli*, and *S. Celozzi* present an efficient numerical framework for calculating the time-domain characteristics of the electromagnetic field generated by a pulsed dipole in the presence of a planar multilayered screen; the double exponential integration technique to compute all the required integrals is used, thereby making the method fast, robust, and accurate. The proximity effect in transient analysis of radio base station is the topic of the paper by *H. Chen* and *Y. Du*. Conductors with strong skin and proximity effects are modeled using an equivalent circuit based on the PEEC method together with rational approximation. A skin-depth based discretization scheme was used to accelerate the computation. Finally, *G. Aiello*, *S. Alfonzetti*, *S. A. Rizzo*, and *N. Salerno* review the FEM-BCI (Finite Element Method–Boundary Condition Iteration) family of hybrid numerical methods, demonstrating their use in some 2-D and 3-D electromagnetic open boundary problems, including both static and dynamic applications.

The guest editor would like to thank the authors for submitting high-quality contributions for publication in the Special Issue, and the reviewers for their tireless efforts aimed at improving the manuscripts.

Guido Ala
DEIM - Department of Energy, Information engineering and Mathematical models, University of Palermo, Italy

Correspondence
Prof. Guido Ala, DEIM - Department of Energy, Information engineering and Mathematical models, University of Palermo, Italy.
Email: guido.ala@unipa.it
http://www.unipa.it/persone/docenti/a/guido.ala/en/index.html

