Call for Papers – Special issue of the IEEE Transactions on Antennas and Propagation

Frontiers in Computational Electromagnetics

Computational electromagnetics (CEM) is the field within electromagnetic engineering aimed at numerically analyzing and computationally solving practical engineering problems involving electromagnetic fields and waves and their interactions with materials and existing or to be designed structures and systems. The importance of CEM to antennas, propagation, and the associated RF applications can hardly be overstated. CEM research and practice are increasingly important in today's information age, for all sorts of emerging wireless and wireline technologies and commodities.

To meet challenges of ever-growing problem sizes and complexities, as well as diversities of applications and modeling requirements, a range of different CEM methodologies and numerical discretization techniques are needed and preferred over a single approach. Today's antenna and propagation researchers and practitioners expect CEM techniques to be easily and confidently used analysis and design tools providing realistic, accurate, and versatile modeling of practical problems and efficient, robust, and reliable solutions with meaningful computing resources, so they can rely on CEM as replacement or augmentation of fabrication and measurement of physical models. This is an announcement of a special issue of the IEEE Transactions on Antennas and Propagation featuring *frontiers in computational electromagnetics at a confluence of methods, computing, and applications.*

This special issue is aimed to show the state of the CEM art for antennas and propagation and to *discuss best and visionary approaches as we move forward.* It realizes that computational electromagnetics is a well-established discipline but still a work in progress, and a very dynamic area of research to develop new and improved methods and codes and provide further reduction of the computational burden, increase of complexity and size of problems that can be tackled, and enhancement of the solution efficiency, accuracy, reliability, and robustness in real-world engineering applications. Within this work and progress, a significant contribution to CEM for antennas and propagation, as well as a successful, high-quality, submission to this TAP special issue on CEM, is expected to meet several key criteria. This includes novelty, mathematical and technical rigor relevant to engineers, practical relevance and applicability, proper and comprehensive validation, relevant and interesting examples, and fair and honest comparison with other methods and approaches. Topics of interest to this special issue include, but are not limited to:

- Advances in all CEM methodologies and all numerical discretization techniques, for all applications
- Breakthroughs in integral-equation, finite-element/difference, asymptotic, and hybrid CEM modeling
- Innovative physical, mathematical, and numerical foundations of CEM methods and algorithms
- Advantages of emerging and growing computing hardware and software infrastructure for CEM
- Major advancements in accuracy, efficiency, reliability, and robustness of CEM simulations
- Unconventional approaches to reducing computational and memory complexities for practical problems
- CEM techniques as true engineering analysis and design tools in antennas and propagation
- Error estimation and control, adaptive refinement, automation, and uncertainty quantification in CEM
- Machine learning and data-enabled advancement of computation in electromagnetics engineering
- Application-driven cutting-edge CEM modeling approaches, implementations, and demonstrations
- CEM solvers for large and multiscale modeling, nonlinear problems, and multiphysics effects
- New ideas and processes for verification, validation, and benchmarking of CEM methods and codes
- Best practices in CEM dissemination, open-source projects, reproducibility, data structures, and programs

Guest Editors:

Branislav M. Notaroš, Colorado State University, CO, USA, notaros@colostate.edu

Francesco P. Andriulli, Politecnico di Torino, Italy, francesco.andriulli@polito.it

Hakan Bagci, King Abdullah University of Science and Technology, Saudi Arabia, hakan.bagci@kaust.edu.sa

DEADLINES:

Paper Submission: June 1, 2022
Final Decision: October 2022
Publication: December 2022

Digital Object Identifier 10.1109/MAP.2021.3132714