



INTERNATIONAL JOURNAL OF
**APPLIED
ELECTROMAGNETICS
and MECHANICS**



Call for Papers:

Special Issue on "Deep learning for analysis and synthesis in electromagnetics"

The [International Journal of Applied Electromagnetics and Mechanics](#) (JAEM) invites submissions for the special issue "Deep learning for analysis and synthesis in electromagnetics".

Issue topic and list of subjects

Analysis and synthesis of fields in electromagnetism has been a broad and well-known area of research for many decades: numerical methods like, e.g., Finite Element Method and Boundary Element Method, are effective in solving analysis problems, while regularization methods as well as optimization algorithms have substantially helped the solution of inverse problems. More recently, the impressive development of Machine Learning and, in particular, Deep Learning (DL) techniques has put the ground for tackling the solution of analysis and synthesis problems in a completely new way and electromagnetics is not an exception.

Moving from this background, DL techniques can be used as surrogate models for the calculation of the electric, magnetic or electromagnetic field, even in case of multi-physics problems. These surrogate models allow the reduction of the computational cost when field models must be solved many times like in an optimization loop. However, the computational burden to train a deep neural network is still heavy and techniques for reducing it, such as the use of transfer learning or the multi-fidelity approach, deserve investigation.

On the other hand, inverse problems can be solved directly by applying deep learning techniques, for instance, identification problems and shape design problems could benefit by DL techniques. However, this is still a challenge because of the ill-posedness of these problems. Regularization techniques can be exploited and their application to DL based evaluations is still an open issue.

Hence, the use of deep learning for solving forward and inverse problems in electromagnetics represents a breakthrough in this field of research. In this frame, we invite potential authors to contribute to this special issue, characterized by (but not limited to) the following topics:

- 1) Field analysis: surrogate models and digital twins (single- and multi-physics field problems), physics-informed neural networks, multi-fidelity approaches;
- 2) Field synthesis: single and multi-objective optimization problems, topology optimization, identification problems, regularization techniques;
- 3) Deep learning techniques: Multilayer Perceptrons MLPs, Convolutional Neural Networks CNNs, Recurrent Neural Networks RNNs, Autoencoders, Generative Adversarial Neural Networks GANs, transfer learning;
- 4) Applications: electromechanical devices, electric and magnetic devices, non-destructive testing, bioelectromagnetism, material modeling, antennas and arrays for millimetric and submillimetric waves, synthetic metamaterials.

Journal information and manuscript submission

International Journal of Applied Electromagnetics and Mechanics is indexed in Web of Science with an Impact Factor of 0.536. The journal is also indexed in Scopus and Ei Compendex, among others. Please see [Abstracted/Indexed in](#) for further details. The peer review process will follow the journal's practice; please carefully revise the [author guidelines](#) before submitting. Authors are requested to submit their manuscript electronically to the journal's [Editorial Management System](#).

Important dates

Submission deadline: January 31, 2023

Expected notification of first decision: April 30, 2023

Expected notification of final decision: July 31, 2023

Expected publication: Autumn 2023

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