

## Preface

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# Selected papers from ISEF-2019 conference

Since its very beginning in Poland in the year 1974, the International Symposium on Electromagnetic Fields in Mechatronics, Electrical and Electronic Engineering (ISEF) is a meeting point of scientists promoting different cultures and knowledge. In fact, the international community behind the conference – which grew up substantially in the years – gathers academic and industrial researchers, working in the broad area of applied electromagnetics. The conference took place in Nancy (France) from 28th through 30th August 2019, organized by the Université de Lorraine.

There were 236 accepted papers with authors coming from 34 different countries. The main topics covered by the papers presented at the ISEF conference can be grouped in four macro-areas: Electromagnetic devices and components (39% of the papers), Modelling and simulations (28% of the papers), Optimization and numerical methods (21% of the papers), Special sessions (12% of the papers). The conference included one panel session on “Optimal design, Metamaterials, 3D Printing” and three special sessions on “Electromagnetism in Medicine and Bioengineering”, “Noise and Vibration in Electrical Machines and Transformers” and “Induction Heating”, respectively.

Here, a collection of 23 papers, presented at the conference and selected after a peer-review procedure, covers the main subjects of interest for the ISEF community. A group of papers is focused on optimal design methods: on one hand, attention is paid to surrogate models with new approaches like neural networks, on the other hand, multiple design criteria are considered at a time, leading to the so called many-objective optimization. A confirmed tendency is the multi-physics – or coupled field – approach, more and more considered when modelling and simulating electromagnetic devices. Vibration analysis in motors is just an example together with the simulation of thermal effects in electrical machines, as well as exploitation of induction heating for stress relief in a structure. In general, the most common applications considered in this Special Issue are power devices like electric motors and transformers; however, special applications ranging from superconductors to biological systems and energy harvesting are considered too.

Almost always, field analysis is the common ground upon which models of specific devices are developed: in fact, field-based models are especially suited to predict the behaviour of devices exhibiting complex shapes and multi-property materials, or to synthesize new devices characterized by better performance or lower cost than existing prototypes. In general, the underlying message is that university and industry should cooperate in a closer way to dominate the challenges of product innovation. Last, not least, the conference is also the meeting point of different generations of scientists, where the reputation of seniors and the enthusiasm of juniors combine together promoting mutual benefit.

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