# Preface

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Martijn van Beurden · Neil V. Budko ·
Gabriela Ciuprina · Wil Schilders ·
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Editors

# Scientific Computing in Electrical Engineering

SCEE 2022, Amsterdam, The Netherlands, July 2022

Springer

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# Preface

The 14th International Conference on Scientific Computing in Electrical Engineering was held from 11–14 July 2022, in Amsterdam, the Netherlands. The conference took place at the Centre for Mathematics and Computer Science (CWI), Amsterdam Science Park, Amsterdam, the Netherlands. It was a festive event, marking the 25th anniversary of SCEE, as the first conference was held in Darmstadt in 1997.

The conference topics were:

- Computational Electromagnetics: Modelling and parameter extraction, discretization and solution methods, Applications: antennas, microwave, interconnects and on-chip passive structures.
- Circuit Simulation and Design: Reduced order modelling, numerical integration techniques, TCAD/EDA tools and techniques, Applications: radio frequency, power electronics, optical networks.
- Coupled Problems: Field-circuit coupled problems, Multi-physics: substrate coupling, coupling with electrical, thermal and mechanical problems, Applications: co-simulation, electromagnetic compatibility, bio-engineering.
- Mathematical and Computational Methods: Inverse problems, optimization, multiscale schemes, solutions methods for large linear systems, differential-algebraic equations, grid computing and parallel computing.

In the latter category, also the relatively new and popular topic of scientific machine learning was addressed, as quite a few researchers are now focussing on this theme, for example, with physics-informed neural networks (PINNs).

This conference edition had several invited/keynote speakers both from academia and industry and contributed presentations in lecture and poster format. SCEE 2022 was honoured by the presence of the following invited speakers:

- Ursula van Rienen (University of Rostock, Germany), Some Highlights from Computational Electromagnetics @ SCEE
- Ricardo Riaza (Universidad Politécnica de Madrid, Spain), A Projective-Based Formalism for Symmetric Modelling of Electrical Circuits
- Michael Günther (University of Wuppertal, Germany), Port-Hamiltonian Systems: A Useful Approach in Electrical Engineering?
- Idoia Cortes Garcia (Eindhoven University of Technology, the Netherlands/TU Darmstadt, Germany), Multiphysical Modelling and Co-Simulation of Superconducting Magnets in Accelerator Circuits
- Carolina Urzúa Torres (TU Delft, the Netherlands), Boundary Element Methods for Electromagnetic Scattering at Complex Geometries
- Fernando Henriquez (EPFL-Switzerland), RELU Neural Network Galerkin Boundary Element Method

Participants of SCEE 2022 in front of the CWI building in Amsterdam

Another feature of this conference was the Industry Morning, where three renowned speakers from industry gave very nice presentations on urgent topics within the electronics industry:

- Liesbeth Vanherpe (ASML, Eindhoven, the Netherlands), Scientific Computing at ASML
- Andras Poppe (SIEMENS Industry Software STS Strategic Innovation group, Hungary, Budapest University of Technology and Economics (BME), Department of Electron Devices, Hungary), Creating New Multi-Domain Digital Twins of LEDS with an Attempt to Describe Their Ageing for Predictive Maintenance Schemes
- Jörg Ostrowski (ABB), Research within ABB.

In addition to these talks, we had a total of 33 oral presentations and 26 poster presentations, completed with two special sessions: a meeting of the European project (Marie-Skłodowska-Curie EID) ROMSOC and a meeting of the ECMI Special Interest Group MSOEE.

On Wednesday evening, the SCEE standing committee, the program committee and the local organizing committee also had a meeting, followed by a lovely dinner with the invited speakers in restaurant “De Kas”, a restaurant in a greenhouse that uses only their own grown products, and recently received a Michelin green star. A special highlight of the SCEE 2022 was the visit to the Van Gogh Museum.

After this excursion, the conference dinner took place in the Vondelpark3 restaurant, which is located in the heart of Amsterdam’s most famous park, in the former Vondelpark pavilion. This venue is also used by Dutch broadcasting organization WNL for their Sunday morning talk show. During the dinner, in the midst of a warm atmosphere, many

ideas and new research directions were discussed in parallel to the enjoyment of good food and wine.

For us, organizing SCEE 2022 took quite some effort. As many of you would know, the 14th edition of the conference was first scheduled to take place in Darmstadt, Germany. Due to strict COVID-19 regulations, the standing committee of SCEE, in close consultation with the Darmstadt organizers, decided to choose a different location. It was decided that the conference would be hosted again in March 2022 in the Netherlands, like in 2020, but now in Amsterdam. Thanks to the efforts of Wil Schilders, who managed to gather a team of organizing committee and avoid postponing the conference by a period of two years. However, due to COVID-19-related measures in the Netherlands, and similar problems in other European countries, in the first months of this year, we had to postpone the conference till 11–14 July 2022 in anticipation that the situation would be better then. We were finally able to have a great and enjoyable in-person conference in the summer of 2022. Over the past year, a lot of hard work has been put into getting the proceedings published in 2023. We thank the reviewers and the SCEE program committee members for their assistance during the reviews of the abstracts and the papers for the proceedings.

September 2023

Martijn van Beurden
Neil Budko
Gabriela Ciuprina
Wil Schilders
Harshit Bansal
Ruxandra Barbulescu

# Organization

## Local Organizing Committee

| | |
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| Neil Budko | TU Delft, the Netherlands |
| Gabriela Ciuprina | Politehnica University of Bucharest, Romania |
| Ruxandra Barbulescu | Politehnica University of Bucharest/INESC-ID Lisbon, Romania/Portugal |
| Harshit Bansal | TU Eindhoven, the Netherlands |

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| Wil Schilders | Treasurer, TU Eindhoven, the Netherlands |
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## Sponsors

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Last but not least, we would like to thank all the members of the standing committee and the program committee, who helped us very much in preparing and running the conference. The careful reviewing process was only possible with the help of the members of the scientific committee who were handling the reviewing process. The anonymous referees did a wonderful job that helped the authors to improve the quality of their contributions.

Finally, we express our gratitude to our colleagues from Springer Heidelberg for continued support and patience during the preparation of this volume.

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