

25 YEARS SCEE

CONFERENCES SCIENTIFIC COMPUTING IN ELECTRICAL ENGINEERING



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SCEE OVER THE YEARS

PREFACE

In 1997, a German team of researchers set out to organize a workshop on Scientific Computing in Electrical Engineering at TU Darmstadt. It turned out to be so successful, that it was repeated in 1998 in Berlin. The enthusiasm of participants, and the observation that there was quite a bit of interest from colleagues in other countries, led to the idea of turning the event into an international conference. The first edition was held in Warnemünde in 2000, still in Germany, but with the character of an international conference. Since then, the SCEE Conferences have traveled Europe, from east to west, and from north to south (see map).

The 2022 edition of the conference hence marks 25 years of SCEE, and this is absolutely worth a celebration. Besides the festive SCEE 2022 conference, with several surprises for participants, we decided to also produce a booklet containing chapters for each of the SCEE conferences held so far. We asked the organisers of all editions to come up with a nice story, review the invited speakers and important topics, and also add a lot of photos. The latter may bring participants back to the year a conference was held, with many nice memories.

We very much hope that you will enjoy this booklet. Undoubtedly, you will recognize many colleagues and many of the locations visited by SCEE. The SCEE community has really become one big family, and it is hoped that we will be able to enjoy many more SCEE conferences in the future. The next stop will be Darmstadt in 2024, the city where the history of SCEE has started 25 years ago.

Wil Schilders, on behalf of the Local Organising Committee, the Program Committee and the SCEE Standing Committee







DMV-WORKSHOP ON SCIENTIFIC COMPUTING IN ELECTRICAL ENGINEERING

URSULA VAN RIENEN

Around the end of 1996, Michael Günter and I were approached by Peter Rentrop and Thomas Weiland and asked if we would like to organise an interdisciplinary workshop with mathematicians and electrical engineers from science and industry on scientific computing in electrical engineering. At that time, Michael was a post-doc in the Scientific Computing in Engineering group of Peter Rentrop at the Department of Mathematics at the Technische Hochschule (TH) Darmstadt. In autumn, I had submitted my habilitation thesis in Theoretical Electrical Engineering and Scientific Computing to the Department of Electrical Engineering. I was a junior research group leader at the Institute for Electromagnetic Field Theory of Thomas Weiland.

Michael and I readily adopted this suggestion and began preparations for a workshop in the early summer of 1997 under the auspices of the 'Scientific Computing' section of the German Mathematical Association (DMV). Our objective was to convene scientists from universities and industries concerned with modelling and numerical simulation of electrical circuits and electromagnetic fields for an intensive exchange of ideas. Back then, the interdisciplinary approach of the discipline 'Scientific Computing' was still novel, characterised by the interplay between mathematics, application and data processing. We aimed at 100 – 150 participants. Right from the beginning, we planned to publish manuscripts on the lectures (8-12 pages each) in a proceedings volume.

We reserved the lecture hall and the foyer, the Georg-Christoph-Lichtenberg-Haus for the banquet, and negotiated reasonable hotel contingents and foods and drinks at the conference dinner. Foods and beverages for the coffee breaks mainly were organised and prepared by ourselves and our helping team of colleagues, students and the secretary. Only the coffee itself was ordered from the cafeteria of the TH Darmstadt. The aim was to keep the conference fee as low as possible.

For this first edition, we invited all speakers before sending out the first announcement to the broader community. We organised four sessions. In total, we had three keynote lectures plus 18 further lectures with a good mixture from universities, research laboratories and industries, mostly younger speakers, and a good proportion of female speakers. In addition, there was the possibility to present contributed posters in a poster session and computer demonstrations. The first call for papers is shown in Fig. 4 and 5. Careful readers of the excerpt from the program shown in Fig. 6 will remark that we had our first international speakers from The Netherlands. They will also observe several names of chairpersons of later SCEE conferences.





Snippets of the list with our hotel arrangements; prices in Deutsche Mark (DM)







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After receiving the confirmations of the invited speakers, the flyer for the first announcement was designed, printed and sent by post to subject-related professional societies, departments and faculties in Germany and other Germanspeaking countries (including the Netherlands as a country with a closely related national language) as well as wellknown colleagues for further distribution.

The workshop was a big success! It brought together more than a hundred scientists interested in numerical methods for simulating circuits and electromagnetic fields. Voices from the participants suggested that it was time to bring these scientific communities together to get to know each other, discuss mutual interests, and start cooperative work. The participants fully appreciated the open, interdisciplinary atmosphere. A collection of selected contributions appeared in 'Surveys on Mathematics for Industry', Vol. 8, No. 3-4 and Vol. 9, No. 2, 1999.

During the workshop in Darmstadt, it became clear that there should be a second edition. Dr Hebermehl from the Weierstrass Institute for Applied Analysis and Stochastics (WIAS), Berlin, volunteered to organise this second workshop in 1998 together with some colleagues. The workshop had a similar scope and brought together more than eighty scientists. At this workshop in Berlin, it was decided to transform into a biennial international conference series called Scientific Computing in Electrical Engineering, briefly SCEE. The vote was to carry out the 2000 workshop at the University of Rostock, chaired by me.



WORKSHOP ON SCIENTIFIC COMPUTING IN ELECTRICAL ENGINEERING

PETER DEUFLHARD, HERBERT GAJEWSKI, GEORG HEBERMEHL, WOLFGANG HEINRICH, ARNULF KOST, ULRICH LANGER, THOMAS WEILAND

The 2nd International Conference on Scientific Computing in Electrical Engineering was held from September 30 to October 2, 1998, in Berlin, Germany. It was organized by the Weierstrass Institute for Applied Analysis and Stochastics (WIAS), Ferdinand-Braun-Institut für Höchstfrequenztechnik, Konrad-Zuse-Zentrum für Informationstechniek Berlin, and Fachgruppe 'Scientific Computing' of the Deutsche Mathematiker-Vereinigung.

It was co-sponsored by the German Chapter of the IEEE Microwave Theory and Techniques Society. The scientific committee was comprised of Peter Deuflhard (Konrad-Zuse-Zentrum für Informationstechniek Berlin), Herbert Gajewski (Weierstrass Institute for Applied Analysis and Stochastics), Wolfgang Heinrich (Ferdinand-Braun-Institut fur Höchstfrequenztechnik), Arnulf Kost (Brandenburgische Technische Universität Cottbus), Ulrich Langer (Johannes-Kepler-Universität Linz), and Thomas Weiland (Institut fur Hochfrequenztechnik of TU Darmstadt).

The local organizing committee consisted of Georg Hebermehl (Weierstrass Institute for Applied Analysis and Stochastics) and Wolfgang Heinrich (Ferdinand-Braun-Institut für Höchstfrequenztechnik).



The conference brought together mathematicians, computer scientists, and engineers from research institutes, universities, and industry who work on modelling and numerical simulation in the field of electromagnetics and electronics.

The focal topics were:

- Microwave Circuits,
- Integrated Optics,
- Optoelectronical Devices,
- Electromagnetic Compatibility,
- Quasistatic Magnetics.

The excerpts from the workshop/conference programme, provided below, clearly show the

state of the art in 1998, and the topics people were interested in some 25 years ago

Wednesday, September 30, 1998

from 10.00	Registration
13.00-13.15	Opening
13.15-14.00	Hans-Christoph Kaiser, Herbert Gajewski Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany Transversal modelling of semiconductor lasers with ToSCA
14.00-14.30	Carl M. Weinert, C. Caspar, HM. Foisel, B. Strebel, L. Molle Heinrich-Hertz-Institut für Nachrichtentechnik Berlin GmbH, Germaay Numerical simulation of optical transmitters and optoelec-
14.30-15.00	Ironic romojonatrs in opical networks Uwe Bandelow, Hane-Christoph Kaiser, Hans-Jürgen Wünche Weientras Institute for Applied Analysis and Stochastics, Berlin, Germany Institut für Physik der Humboldt-Universität zu Berlin, Germany Energy Calculations for Localized Multiparticle Stats in

15.00-15.30	Jan Sieber, Mindaugas Radziunas
	Weierstrass Institute for Applied Analysis and Stochastics,
	Berlin, Germany
3	Numerical Simulation of Self Pulsating Semiconductor
	Lasers
15.30-16.15	Frank Schmidt
	Konrad-Zuse-Zentrum für Informationstechnik Berlin,
	Germany
2	Transparent Boundary Conditions for the Numerical Solu-
	tion of Scattering Problems in Integrated Optics
16.15-16.45	Break
16.45-17.30	Reinhard März
	Siemens AG, Corporate Technology, Munich, Germany
2	Design and Modeling for Integrated Optics
17.30-18.00	Matthias Ehrhardt, Anton Arnold
	Technische Universität Berlin, Germany
2	Discrete Transparent Boundary Conditions for General
	Schrödinger-Type Equations
18.00-18.30	Gunther Schmidt
	Weierstrass Institute for Applied Analysis and Stochastics,
	Berlin, Germany
	Commissional FEM for Holesholts anothers

08.30-09.15	Peter Rentrop, Michael Günther, Markus Hoschek TU Darmstadt, Fachbereich Mathematik, Germany
1	Differential-Algebraic Equations in Electric Circuit Simu- lation
09.15-09.45	Daniel N. E. Skoogh Department of Mathematics, Chalmers University of Tech- nology, Sweden
1	Model Reduction by the Rational Krylov Method
09.45-10.15	Alain Bossavit Electricité de France, France
1	Revisiting Spurious Modes
10.15-10.45	Break
10.45-11.30	Wolfgang Heinrich Ferdinand-Braun-Institut für Höchstfrequenztechnik
1	(FBH), Berin, Germany The Finite-Difference Method in Frequency Domain – An Indispensable Tool for the Electromagnetic Analysis of Mi- crowave Integrated Circuits and Multi-Chip Modules
11.30-12.00	Georg Hebermehl, Rainer Schlundt, Horst Zscheile Weigenst Henrich Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany Perdinand-Braun-Institut für Höchstfrequenstechnik, Berlin, Germany Computation of Eigen Modes for Trensmission Lines
12.00-12.30 4	Thomas Schnelle, Torsten Müller, Günter Fuhr Humboldt University, Dept. Biology, Germany High frequency electric fields in microstructures - simula- tion and biological applications
12.30-14.00	Lunch-break
14.00-14.45 4	Thomas Weiland TU Darmstadt, FB18, FG TEMF, Germany Maxwell's Grid Equations as Basis for EMC Computations

E.

14.45-15.30 4	Gerhard K. M. Wachutka Institute for Physics of Electrotechnology, Munich Univer- sity of Technology, Germany Numerical Analysis of Distributed Inductive Parasitics in
	High Power Bus Bars
15.30-16.45	Poster session & Break
4	Henning Glasser, Thomas Schnelle, Günter Puhr Humbold University, Dept. Biology, Germany THE TOLERANCE OF ADHERENTLY GROWING CELLS TO PERMANENT HIGH FREQUENCY ELEC- TRICAL PIELDS
4	Wolfgang Hackbusch, Steffen Börm Universität Kiel, Germany Computation of azisymmetric Eigenmodes of Mazwell's Equation
5	Arnim Nethe Brandenburgische Technische Universität Cottbus, Lehrstuhl Theoretische Elektrotechnik, Germany Simulation of the electromagnetic field of an induction hardening set-up
5	Michael Schinnerl Johannes Kepler University Linz, Austria Multigrid Methods for Coupled Nonlinear Magneto- Mechanical Problems
	Rainer Schlundt, Georg Hebermehl, Horst Zscheile, Wolfgang Heinrich Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany Berlin, Germany Berlin, Germany
1	On the Computation of Systems of Linear Algebraic Equa- tions for Monolithic Microwave Integrated Circuits

from 20.00	Welcome Party
5	Numerical Calculation of Slowly Varying Electromagnetic Fields Using the Finite Integration Technique
17.30-18.00	Markus Clemens, Thomas Weiland TU Darmstadt, FB18, FG TEMF, Germany
4	many Electromagnetic Field Computation for Linear and Nonlin- ear Shielding by Thin Magnetic Layers in EMC
16.45-17.30	Arnulf Kost Brandenburgische Technische Universität Cottbus, Ger-
5	Manfred Uhle, Dietmar Hömberg, Jürgen Fuhrmann Weierstrass Institute for Applied Analysis and Stochastics Berlin, Germany Numerical simulation of induction hardening of steel

08.30-09.15	Roland H. W. Hoppe
	Institute of Mathematics, University of Augsburg, Ger-
5	many Numerical Solution for Interior and Exterior Domain Problems in Electromagnetic Field Computation
09.15-09.45 5	Ralf Hiptmair Institute of Mathematics, University of Augsburg, Ger- many Multigrid Method for Eddy Current Problems
09.45-10.15	Andrea Toselli
5	Courant Institute, New York University, USA OVERLAPPING SCHWARZ METHODS FOR MAXWELL'S EQUATIONS IN CONDUCTIVE MEDIA
10.15-10.45	Break
10.45-11.30	Oszkar Biro
5	IGTE, Technical University of Graz, Austria EDGE FINITE ELEMENTS IN SOLVING EDDY CUR- RENT PROBLEMS
11.30-12.15	Kay Hameyer
	Katholieke Universiteit Leuven, E.E. Dept., Div.
5	ESAT/ELEN, Leuven, Belgium Computation of quasi-static electromagnetic fields
12.15-12.45	Michal Křížek, Liping Liu Mathematical Institute, Academy of Sciences, Czech Re- public
5	Finite element approximation of nonlinear temperature and magnetic fields in electrical devices
12.45-13.15	Michael Kuhn
ADIAD	

This conference edition had several invited/keynote speakers and contributed presentations in lecture and poster format. The info about the keynote speakers and the titles of their talks is mentioned below:

- Oszkar Biro, Edge finite elements in solving eddy current problems
- Kay Hameyer, Computation of quasi-static electromagnetic fields
- Wolfgang Heinrich, The Finite-Difference Method in Frequency Domain – An Indispensable Tool for the Electromagnetic Analysis of Microwave Integrated Circuits and Multi-Chip Modules
- **Roland H.W. Hoppe**, *Numerical Solution of Interior and Exterior Domain Problems in Electromagnetic Field Computation*
- Hans-Christoph Kaiser, Herbert Gajewski, Transversal modelling of semiconductor lasers with ToSCA
- Arnulf Kost, Electromagnetic Field Computation for Linear and Nonlinear Shielding by Thin Magnetic Layers in EMC
- Reinhard März, Design and Modelling for Integrated Optics
- Peter Rentrop, Michael Günther, Markus Hoschek, Differential Algebraic Equations in Electric Circuit Simulation
- Frank Schmidt, Transparent Boundary Conditions for the Numerical Solution of Scattering Problems in Integrated Optics
- Gerhard K.M. Wachutka, Numerical Analysis of Distributed Inductive Parasitics in High power Bus Bars
- Thomas Weiland, Maxwell's Grid Equations as Basis for EMC Computations in Time and Frequency Domain



















WARNEMÜNDE, GERMANY | AUGUST 20 - 23

SCEE 2000

URSULA VAN RIENEN

The first genuinely international SCEE conference was named the 3rd International Workshop on Scientific Computing in Electrical Engineering, SCEE 2000. It followed the two earlier workshops held in 1997 at the Technische Hochschule Darmstadt and 1998 at Weierstrass Institute for Applied Analysis and Stochastics (WIAS) in Berlin under the auspices of the German Mathematical Society.

SCEE 2000 took place in the Baltic seaside resort (Rostock) Warnemünde, Germany, from August 20 to 23, 2000. Nearly a hundred scientists and engineers from thirteen countries gathered in Warnemünde to participate in the conference. The University of Rostock, the oldest university in Northern Europe founded in 1419, and its Faculty of Computer Science and Electrical Engineering hosted the workshop. It has been my place of work since autumn 1997.

Like the previous workshops in Darmstadt and Berlin, SCEE 2000 has aimed at bringing together two scientific communities - applied mathematicians and electrical engineers who research the field of scientific computing in electrical engineering. Again, it was decided to concentrate on selected major topics, namely numerical methods for simulating circuits and electromagnetic fields. Of the nearly hundred SCEE 2000 participants, 25 % came from industry and research laboratories and about 75 % from universities. The majority of the participants came from Europe, including Eastern Europe, yet some also came from the US. We guess that the number of mathematicians and electrical engineers under the participants was equal.

The main topics of SCEE 2000 were: Computational Electrodynamics, Circuit Design, Coupled Problems. The conference was co-organised by the Special Interest Group on Scientific Computing in Electronic Industry of the European Consortium for Mathematics in Industry. The SCEE 2000 programme committee consisted of scientists from industry and universities. Its members were Michael Günther, Universität Karlsruhe (TH), Germany; Ulrich Langer, Universität Linz, Austria; Ursula van Rienen, Universität Rostock, Germany; Jan ter Maten and Wil Schilders, TU Eindhoven and Philips Research Laboratories, Eindhoven, The Netherlands; Uwe Feldmann, Infineon Technologies, Munich, Germany. An international advisory committee supported the programme committee: Marcello Anile, Universita di Catania, Italy; Andreas Blaszczyk, ABB, Heidelberg, Germany; Alain Bossavit, EDF, Clamart, France; Peter Deuflhard, Konrad-Zuse-Zentrum für Informationstechnik (ZIB) Berlin, Germany; Hartmut Ewald, Fachhochschule Wismar, Germany; Albert Gilg, Siemens,

München, Germany; Kay Hameyer, Katholieke Universiteit Leuven, Belgium; Volkert Hansen, Universität Wuppertal, Germany; Georg Hebermehl, Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany; Lauri Kettunen, Tampere University of Technology, Finland; Roswitha März, Humboldt-Universität zu Berlin, Germany; Irina Munteanu, Politehnica University of Bucharest, Romania; Peter Rentrop, Universität Karlsruhe (TH), Germany; Peter Thoma, CST GmbH, Darmstadt, Germany; Dirk Timmermann, Universität Rostock, Germany; Thomas Weiland, Technische Universität Darmstadt, Germany.

The programme committee invited six plenary speakers having in mind three goals: gaining leading experts, inviting mainly young scientists, which is already a kind of SCEE tradition, and gaining speakers from industry. A vital principle of the SCEE workshops is to have only plenary sessions. Therefore, also poster sessions took place - commonplace in electrical engineering conferences but less usual in mathematical congresses. The programme committee had chosen 30 contributed talks that represented the scope of contributed papers and broad interest. A total of 17 related posters complemented the oral sessions. As a novelty to the conference series, a poster prize was introduced to honour the best posters. Three invited speakers, Leszek Demkowicz, Irina Munteanu and Ronald Rietman, comprised the prize committee. They chose the poster of Olaf Michelsson (Ilmenau) for the first prize and that of Karsten Rothemund (Rostock) for the second prize. Overall, the contributions had a high scientific level. The proceedings were published in 2001 in the Springer series 'Lecture Notes in Computational Science and Engineering' by Springer (LNCSE, volume 18, ISBN: 978-3-642-56470-3). The peer-reviewed proceedings comprise the papers of the six invited speakers and 37 contributed papers.

Before the official start, we offered a guided tour through Warnemünde. Afterwards, registration opened in the conference place, the Technologiezentrum Warnemünde. Then, on the early evening of Sunday, August 20, 2000, the conference was opened with the invited talk by J. Roychowdhury from the Bell Laboratories, Murray Hill, USA, on *Multi-Time PDEs for Dynamical System Analysis*. Later, all participants were invited for a Welcome Cocktail in the University Main Building with the Mayor of Rostock.

The remaining five invited talks of 50 minutes each opened the first morning and afternoon session. The sessions were organised in a mixed order in two sessions on Computational Electromagnetics (CE), two sessions on Circuit Analysis (CD), and one session on Coupled Problems (CP).

These were the invited speakers and the topics of their lectures: R. Rietman from the Philips Research Laboratories, Eindhoven, The Netherlands, on *A Common-Mode Skeleton Model for EMC Simulations* (CE), C. Tischendorf; from the Humboldt Universität zu Berlin, Germany, on *Benefits of Special Structures of DAEs for the Time Domain Analysis of Integrated Circuits and Consequences for the Model Design* (CD), I. Munteanu from the Politehnica University Bucharest, Romania, on *Coupling Electromagnetic Devices to Electric Circuits using Parameter Extraction* (CP), L. Demkowicz from The University of Texas at Austin, USA, *Adaptive hp-FE Modeling for Maxwell's Equations with Applications to Scattering and Waveguides* (CE), and P. Rentrop from the Universität Karlsruhe (TH), Germany, on *Numerical Integration and Software in Electric Circuit Simulation* (CD).

From Monday morning till mid-day of Wednesday, six contributed talks of 20 minutes each followed the invited



talks. The poster exhibitions lasted from Monday 9:00 to Tuesday 18:00 with two specific poster sessions of 45 minutes each on Monday and Tuesday before the lunch break.

Besides the stroll through Warnemünde and the Welcome Cocktail with the Mayor on Sunday, the social programme comprised several other activities were offered throughout the conference. Early Monday evening, tours in small subgroups to local companies were offered - among others to a shipyard and a start-up developing satellite components and an "artificial nose" to detect dangerous odours. The workshop dinner on Tuesday evening took place on board a cruise vessel doing a round- trip from Warnemünde to the City Harbour of Rostock and back. In that, it passed the Overseas Harbours amongst others. The poster prizes were awarded during this trip. After the conference's closing, the opportunity existed to be part of a guided tour through Rostock.

One "side-effort" of the local organising committee comprised of Dirk Hecht, Hans-Walter Glock and myself was to find a suitable logo for SCEE 2000 and the upcoming workshops. We were fortunate to receive help from the department for design and interior design of the Hochschule Wismar, a university for applied sciences. Students of Hanka Polkehn made several designs. The logo designed by the student Ramona Weyde-Ferch was chosen as the winner. It is still the actual SCEE logo. The four blue letters SCEE are arranged with some white lines, interpretable as field lines or wavefronts, and part of a bracket, standing for a mathematical bracket and symbolising bringing together several communities, mathematicians and engineers, university and industry.

Very important in launching a scientific event such as the SCEE is substantial financial support. The Programme Committee was greatly indebted to the Deutsche Forschungsgemeinschaft (DFG), the Ministry of Education, Science and Culture of Mecklenburg-Vorpommern, the Universität Rostock, the hanseatic town of Rostock and these private companies: ABB, CST GmbH, Infineon Technologies, Philips, Sun microssystems, Techniker Krankenkasse.





EINDHOVEN | JUNE 23 - 28

SCEE 2002

WIL SCHILDERS, JAN TER MATEN, STEPHAN HOUBEN (†)

While completing the SCEE-2000 conference in Warnemünde, the question arose who would organize the next conference. The three preceding events were organized in Germany, but SCEE-2000 was the very first with the flag "International". Therefore, it was natural to ask a foreign team to continue the series. Because of the larger percentage of participants from The Netherlands and Italy, these countries were clear candidates and indeed they became organisers in 2002 and 2004, respectively.

When traveling back by train from Rostock to Utrecht, in Hamburg the advertisements for the Olympic Games showed up. Then we realized that we had agreed upon doing a lot of work. Indeed, during the next week at Philips, a tough discussion with the local and higher management took place to discuss the matter. In the end, Eindhoven University of Technology (TU/e, actually CASA: Center for Analysis, Scientific computing and Applications, headed by Prof. Bob Mattheij) agreed to become involved, and the time spent by us should be done within the time the organisers worked at CASA.

We also could include time of the PhD-student Stephan Houben (TU/e-CASA and Philips), who above an amazing sound level of mathematics also had a deep knowledge and interest in scientific programming and, important for us, in modern tools for organising a website and environment for a conference as well. He got assistance from two students of the Fontys University of Higher Education: Mrs Aminah Santowikromo and Mr Wessel Heijmeriks. A nice and robust website adjusted to client dynamics was the outcome. Planning was perfect (as anything done by Stephan). The first version of the website was active in the first half of 2001, well ahead of the conference planned for end of June 2002. It included a conference submission and evaluation system for contributed papers. The students graduated for their BSc in July 2001. They also came up with ideas for the poster of the conference, and we chose the "spider in the web" for this.

Of course, other points of attention were to limit the costs and to get proper advertising. For the latter we created email lists, and several times we distributed advertisements and gave oral announcements at meetings and workshops. In those days, the internet was still in its infancy. So a website was not that easily found as today. Nevertheless, we managed to attract a record number of 120 participants, which is the highest over all the years until now (2022).

As far as limiting the costs is concerned: TU/e and Philips did not provide financial backup in case of losses. Hence, we had to keep strict control of the costs, and they had to be as low as possible. We were pleased that a visit of Dr Dirk Hecht of the University of Rostock shared his experience regarding SCEE















2000 with us. He also contributed the first 1000 Euro, being left over from the previous conference. Note that the Euro was only introduced at the beginning of 2002, hence SCEE 2002 was the first conference with fees in the Euro currency! We started a Stichting SCEE (Dutch Foundation) with Wil, Stephan and Jan as executive board members, resp. chairman, secretary, and treasurer. All finances went via this Stichting. This way of working gave us a certain independence of the university.

One way of limiting the costs was to take care of the catering ourselves. Wil asked his stepson Erik Russner, and his fiancée Cynthia Janssen, to take care of this. Every morning they went to the TU/e kitchen, collected the coffee and tea, and during the entire day they took care of participants. Refreshments were bought by ourselves, and on Tuesday we served the famous ''Limburgse vlaai'' with the coffee/tea.

The physical location of the conference was booked at the Auditorium of the TU/e. For lunch the participants mainly went to the (nearby) city centre. During lunch time on the big screens in the Auditorium some world champion football matches were shown. The tournament was won by Brasil, beating Germany 2-0 in the final.

Photography was done by Dr Jos Janssen, a retired associate professor of the CASA group at TU/e, and by Walter ter Maten, son of Jan, who also was yet a student at Fontys. Every session was photographed, every meeting, as well as the conference dinner and the social tour to the historic city of Heusden. During one session the chairman was invoking the session for questions. He started himself, but when it remained silent after asking the audience, Dr Janssen raised his hand. The chairman showed his surprise: "There is a question by ... the photographer". After the conference, Walter collected all pictures with an html-environment and burned them onto CD-rom. Every participant received a copy. Distribution of the CD-roms and of the book of proceedings were done by Philips. Philips also provided facilities for printing posters for the poster sessions. TU/e printed the Book of Abstracts (BoA). By Stephan's efforts this BoA was in a 2-page, 2-column IEEE format. It became the default layout for extended abstracts for the future SCEE events. On Monday evening there was a reception at the Eindhoven City Hall, where the vice-mayor welcomed all participants.

A highlight of the conference was the Industrial Day in the Blue Hall of the Auditorium with invited speakers from electronic industries. Owing to this, several additional oneday participants from industry showed up.

The Poster Sessions were started by a 2-minute advertisement by each contributor, the so-called ''poster blitz''. This session was chaired by Stephan. He was very strict in keeping each one's time limit by use of a loud bell, while allowing a humorous atmosphere. This idea of poster advertisement was adopted in next SCEE-conferences as well.

The social tour was to the former fortress city Heusden where we had lunch in a pancake (famous Dutch delicacy, coming in many variations) restaurant, followed by a guided city tour. Afterwards the conference dinner was held in the Meiling Restaurant in Eindhoven, a traditional Chinese restaurant that is known for its excellent food.

On Friday the conference was closed. No one likes to be the last speaker at a conference. To make people jealous we asked Dr Gisela Pöplau of the University of Rostock who provided





raditional windmill in historic city of Heusen

this time the talk on *Fast Calculation of Space Charge in Particle Tracking by Multigrid Techniques*. She was honoured by a bottle of wine.

After the conference and the review of the submitted papers, the compilation of the book was done by Stephan and Jan at Jan's home using an internet connection by telephone Quite customary in those days). We became experienced with Springers LaTeX Proceeding facilities and after some time we had to enlarge the size of the LaTeX interpreter. On the cover came the picture of the chip as spider in the web, a picture that was part of a series of pictures developed for Philips.

INVITED SPEAKERS

Computational Electromagnetics

- Prof. Dr. Susan C. Hagness (University of Wisconsin-Madison, USA)
- Dr. Patrick Joly (INRIA, Le Chesnay, France)
- Dr.-Ing. Rolf Schuhmann (TU Darmstadt, Germany)
- Prof. Igor Tsukerman (The University of Akron, USA) Circuit Simulation
- Dr.-Ing. habil. Peter Schwarz (Fraunhofer-Institut für Integrierte Schaltungen, Dresden, Germany)
- **Dr. Tom A.M. Kevenaar** (Philips Research Laboratories Eindhoven, The Netherlands)

Coupled Problems

 Prof. Antonio Di Carlo (Università degli Studi "Roma Tre", Italy)

INDUSTRY DAY

The Invited Speakers for the Industry Day presented their vision on trends and challenges in research (and especially in electromagnetics and in IC and related areas), and in technologies.





They talked on the following topics:

- Vision on trends and challenges in research,
- Consequences of roadmaps on design,
- Impacts of manufacturing,
- Future needs of industry,
- Next generation simulation tools.

The speakers were also asked to talk on partnerships and cooperations between universities and industry.

- Prof.Dr. Robert M.M. Mattheij (Eindhoven University of Technology) Does Industry need Mathematicians?
- Ir. Gerard F.M. Beenker (Philips Research Laboratories (NatLab), Eindhoven) *Trends in IC Design: large numbers and small dimensions*
- Dr. Frank Demming-Janssen (Computer Simulation Technology (CST), Darmstadt) New trends in EM-Simulations, Seamless Integration of Best in Class within Design Environment
- Dr. Koen van Eijk (Magma Design Automation Inc, Eindhoven) Large scale continuous mathematical problems in IC implementation

- Dr. Wilhelm Dürr (Siemens AG, Medical Solutions, Erlangen) Electromagnetic Computation in Medical Imaging -Achievements and Future Needs as exemplified by Magnetic Resonance Imaging
- Dr. Marc Swinnen (Sequence Design, Paris) In-depth Speed and Accuracy Comparison of Inductance Extraction for SoC Signal Integrity and Tool Integration
- **Prof.Dr. A. Peter M. Zwamborn** (TNO Physics and Electronic Laboratory, The Hague) *Electromagnetic modeling for solving EM-problems relevant to Industry and Society*
- Dr. Isaac Shpantzer (CeLight, Silver Spring, MD, USA) Coherent Optical Communication - Architecture, Modeling and Optimization

SIGNIFICANCE OF SCEE-2002 AND FUTURE EDITIONS

The conference provided a platform for European students (MSc, PhD and PostDocs) in mathematics and electronic engineering to present their research in electromagnetics (FDTD), in circuit simulation (multirate time integration), in solving linear and nonlinear systems, in optimization, in modeling (model order reduction, neural networks). We



Andreas Bartel (left) and Giuseppe Ali at SCEE 2002





(middle) and Wim Schoenmaker







mention: Andreas Bartel (now Privat Dozent at the University of Wuppertal), Stephan Houben (see below), Joost Rommes (now MentorGraphics/Siemens Digital Industries Software, Grenoble/Portland), Sandra Bruin (now TU Eindhoven), Anke Frohberger (to ABB AG Forschungszentrum Deutschland, Ladenburg), Thomas Voss (now at ASML, Veldhoven), Arie Verhoeven (now with Transfer Solutions, Leerdam), Michael Striebel (now with Univ. of Applied Sciences, Konstanz) and many more. SCEE also offered opportunities for colleagues at Philips Research to present results.

The SCEE series evidenced for successfully applying in European projects involving colleagues from the SCEE Program Committee. Here we mention (roughly for the period until 2010):

- COMSON RTN Marie Curie (2005-2009, COupled Multiscale Simulation and Optimization in Nanoelectronics)
- CHAMELEON RF (2005-2008, Comprehensive High-Accuracy Modelling of Electromagnetic Effects in Complete Nanoscale RF Blocks)
- ICESTARS FP7 (2008-2010, Integrated Circuit/EM Simulation and design Technologies for Advanced Radio Systems-onchip)
- O-MOORE-NICE! (2007-2010, Operational model order reduction for nanoscale IC Electronics)
- ASIVA14 (2014-2018, Analog SImulation and Variability Analysis for 14nm designs)

WHAT HAPPENED TO THE ORGANIZERS

Stephan Houben defended his PhD-Thesis at TU/e in 2003. He went to Magma Design Automation in Eindhoven (later part of Synopsis). Very regretfully, he died too soon on Nov 1, 2018, in Eindhoven, at the age of 42, leaving behind his wife and three children. Jan ter Maten and Wil Schilders moved from Philips Research to NXP Semiconductors in 2006, a newly established company (formerly Philips Semiconductors). In 2011 they found new employment at the University of Wuppertal (Germany) and at TU/e, respectively.

Jan was involved as co-organizer at SCEE-2014 (Wuppertal) and Wil at SCEE-2020 (Eindhoven) and 2022 (Amsterdam). Jan retired in Sept. 2020. Wil is still active at TU/e and as a director of the Dutch Platform for Mathematics. He also revived the SCEE Foundation for centralizing the organization of SCEE. He was/is also very active in mathematics for industry organisations: Wil was president of ECMI from 2010-2011, president of EU-MATHS-IN from 2016-2020, and will be president of ICIAM from 2023-2027.

20 YEARS LATER

Between SCEE 2002 and SCEE 2022, there is a time span of 20 years. SCEE has really become a family, with many participants coming back for each edition. Below some photographs of faithful participants, 20 years younger than right now! If you are not in one of the pictures, please excuse us ... we needed to make a selection.



W.H.A. Schilders, E.J.W. ter Maten,
S.H.M.J. Houben (Eds.):
Scientific Computing in Electrical
Engineering — Proceedings of the
SCEE-2002 conference held in
Eindhoven. Series Mathematics in
Industry Vol. 4, Springer Verlag, Berlin,
2004. ISBN 3-540-21372-4.



CAPO D'ORLANDO, ITALY | SEPTEMBER 5 - 9

SCEE 2004

ANGELO MARCELLO ANILE (†)

The 5th International Conference Scientific Computing in Electrical Engineering was organized by the Group of Applied Mathematics at the University of Catania (www.unict.it), Italy. It was held in the period September 5-9, 2004 in Capo d'Orlando, Italy, a charming town by the sea on the northern coast of the island of Sicily. The conference site was the school Istituto Tecnico Commerciale per Geometri "Francesco Paolo Merendino".

SCEE 2004 had the financial support of STMicroelectronics, Italian National Group of Mathematical Physics and National Group of Scientific Computing, Istituto Nazionale di Alta Matematica "Francesco Severi", Philips Research Laboratories Eindhoven, Infineon Technologies A.G. from Munich, Istituto Tecnico Commerciale per Geometri "Francesco Paolo Merendino" at Capo D'Orlando, Synapto from Catania, Fraunhofer Institut fur Techno- und Wirtschafts- mathematik at Kaiserslautern, Comune di Capo D'Orlando.

The scientific committee was formed by A. Marcello Anile, Flavio Canavero, Daniel Ioan, Uwe Feldmann, Michael Gunther, Ulrich Langer, E. Jan W. ter Maten, Ursula van Rienen, Wil H.A. Schilders, Thomas Weiland. The main topics of the conference comprised:

- Computational electromagnetics,
- Circuit and device modeling and simulation,
- Coupled problems and multi-scale approaches in space and time,
- Mathematical and computational methods including uncertainty quantification,
- Model order reduction,
- Industrial applications.

The scientific program included invited and contributed talks, and poster sessions. More than 60 scientists from several countries attended SCEE 2004.

Seven invited speakers covered all the subjects of the conference with inspiring and visionary presentations (in alphabetical order):

- Dr. Augusto Benvenuti (STMicroelectronics, Agrate Brianza, Italy), *Challenging coupled problems in TCAD*
- **Dr. Georg Denk** (Infineon Technologies, Munich, Germany), *Circuit simulation for nanoelectronics*
- **Prof. Erion Gjonaj** (Technische Universitaet, Darmstadt, Germany), *Low noise conservative scheme for the solution of Maxwell's equations in PIC simulations*



- **Prof. Anne Kværno** (Norwegian Institute of Technology, Trondheim, Norway), *Time integration methods for coupled equations*
- Dr. Ing. Siegbert Martin (Marconi Communications GmbH, Backnang, Germany), *Microwave issues in EM simulation and design of RF modules, plastic filters and circulators*

In addition, there have been 43 oral contributed talks, selected by the scientific committee, and 29 posters.

The proceedings, after a regular peer-review process, were published in a book of the Springer series on Mathematics in Industry dedicated to the SCEE conferences. The contributions were divided into five parts according to the specific investigated subject.



Editors: A. Marcello Anile, Giuseppe Ali, Giovanni Mascali Springer series: Mathematics in Industry (Volume 9) - Published in 2006 -











SINAIA, ROMANIA | SEPTEMBER 17 - 22

SCEE 2006

GABRIELA CIUPRINA, DANIEL IOAN

The sixth international conference SCEE was held in Sinaia, Romania, in 2006. It was organized by Politehnica University of Bucharest (www.upb.ro), Numerical Modelling Laboratory (www.lmn.pub.ro), with the support of the Electrical Engineering Department (www.electro.pub.ro). Being an unique opportunity, we decided to chose the venue in the a mountain resort Sinaia, a popular destination for hiking and winter sports, with breathtaking views as well as a rich history related to the royal family of Romania. The conference site was Hotel "New Montana" (https://newmontana.ro/en/).

SCEE 2006 was sponsored by Philips Research Laboratories, Eindhoven (www.philips.nl), Infineon Technologies from Munich (www.infineon.com), ST Microelectronics (www.st.com), Computer Simulation Technology (www.cst.com), IEEE Romania Section (www.ieee.ro) and the Romanian CEEX programme (www.mct-excelenta.ro). 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 Network),

Coupled Problems

Field-circuit coupled problems, Multi-physics (Substrate coupling, Coupling with electrical, thermal and mechanical problems, Application: Co-Simulation, Electromagnetic Compatibility, Bio-engineering,

Mathematical and Computational Methods Inverse Problems, Optimization, Multi-Scale Schemes, Solutions methods for large linear systems, Differential-Algebraic Equations, Grid Computing, Grid Computing.







The Program Committee consisted of: Prof. A.M. Anile (Universita di Catania, Italy), Dr. A. Bossavit (Ecole Superiore d'electricite Gif sur Yvette, France), Assoc. Prof. Dr. G. Ciuprina (Univ. "Politehnica" din Bucuresti, Romania), Dr. U. Feldmann (Infineon Technologies AG, Germany), Prof. Dr. M. Günther (Bergische Universitat Wuppertal, Germany), Prof. Dr. D. Ioan (Univ. "Politehnica" din Bucuresti, Romania), Prof. Dr. D. Ioan (Univ. "Politehnica" din Bucuresti, Romania), Prof. Dr. U. Langer (Johannes Kepler Univ., Austria), Dr. E.J.W. ter Maten (Philips Research, The Netherlands), Prof. Dr. U. van Rienen (Univ. Rostock, Germany), Prof. Dr. W.H.A. Schilders (Philips Research, Eindhoven Univ. of Technology, The Netherlands), Prof. Dr. T. Weiland (Technische Univ. Darmstadt, Germany).

SCEE 2006 was honoured by the presence of the following invited speakers:

Electromagnetics

- Dr. Francois Henrotte (RWTH Aachen University Institut fur Elektrische Maschinen, Germany), *The energy viewpoint in computational electromagnetics*
- Dr. Irina Munteanu (CST Germany), *RF & Microwave* Simulation with the Finite Integration Technique - From component to system design

Circuit Simulation

- **Prof. Athanasios C. Antoulas** (Rice University Electrical and Computer Engineering Dpt. ECE, Houston, Texas, USA), *Approximation of large-scale dynamical systems: An overview and some new results*
- Dr. Janne Roos (Helsinki University of Technology, Circuit Theory Lab - APLAC, Finland), *Overview of Circuit-Simulation Activities at TKK CTL*
- Prof. Luis Miguel Silveira (Technical University of Lisbon (IST), School of Engineering, Department of Electrical and Computer Engineering, INESC-ID, Lisbon, Portugal)
 Outstanding Challenges in Model Order Reduction

Coupled Problems

- **Dr. Herbert De Gersem** (Technical University Darmstadt, Computational Electromagnetics Lab. - TEMF, Germany), *Transient field-circuit coupled models with switching elements for the simulation of electric energy transducers*
- **Dr. Andrea Marmiroli** (STMicroelectronics, Italy), Technology and Device modelling in micro and nanoelectronics: current and future challenges





Editors: Gabriela Ciuprina, Daniel Ioan Springer series: Mathematics in Industry (Volume 11) - Published in 2007 -

Generic Mathematical and Computational Methods

- **Prof. Barbara Wohlmuth** (Stuttgart University Institut fur Angewandte Analysis und Numerische Simulation IANS, Germany), *Advances in Mathematical and Computational Methods Applied in Electrical Engineering*
- Prof. Piet Hemker (Centre for Mathematics and Computer Science - CWI, Dpt. Modelling, Analysis and Simulation, Amsterdam, Univ. of Amsterdam, Dpt.of Mathematics, The Netherlands), Space mapping and defect correction for efficient optimization

Special COMSON course by. Prof Ioan Lager, Delft University, Scientific Output: drawing a publication and preparing a presentation.

Overall, there were 100 contributions (40 oral presentations and 60 posters) including the talks of the Invited Speakers. It has been a remarkably successful conference, there were about 90 participants from 14 countries. The local impact was strong, about 40% the participants being from Romania. The outing started with a visit to the Bran Castle, which was initially built as a fortress on the Transylvanian side of the historical border with Wallachia, and ended at the Ski Chalet Cabana Stâna Regală where the conference dinner took place. Here, SCEE participants enjoyed traditional Romanian food and the special dulcimer music by the famous Marius Mihalache.

The special dinner for invited speakers was organized by Prof Daniel Ioan at his own holiday home. It was a good moment to thank the local organizing team and think, in an PC meeting held there, at the next SCEE, in 2008.

We are sure that the participants at SCEE 2006 enjoyed the conference, the venue, the outing (and even, for some of them, some unexpected encounter of bears), as well as meeting international colleagues, setting up new collaborations, discussing joint projects or joint research. For us, organizing SCEE 2006 was a challenge, but we did it with pleasure, being motivated by the research domain with enjoy, the conference high quality and the honour of being editors of a Springer volume, which was published one year later, in 2007.









ESPOO, FINLAND | SEPTEMBER 28 - OCTOBER 3

SCEE 2008

JANNE ROOS, LUIS R. J. COSTA

The seventh international SCEE conference was held at the main building of the Helsinki University of Technology ("TKK") in Espoo, Finland. The TKK main building was designed by the famous Finnish architect Alvar Aalto. In fact, in 2010, TKK, Helsinki School of Economics, and the University of Art and Design Helsinki merged to form Aalto University.

SCEE 2008 was organized by the Circuit Theory Group of the Department of Radio Science and Engineering ("RAD"). SCEE 2008 was sponsored by Nokia, STMicroelectronics, ABB, CST, AWR, MunEDA, Academy of Finland, TKK, City of Espoo, CoMSON Research Training Network, and the Finnish Society of Electronics Engineers.

(http://radio.tkk.fi/en/conferences/scee2008/)

I (Janne Roos, one of the authors of this chapter) will begin by describing from my personal point of view why SCEE 2008 was organized in Finland. I met SCEE activists Dr. E. Jan W. ter Maten, Prof. Dr. Wil Schilders, and Prof. Dr. Michael Günther for the first time at the ECMI 2002 conference in Jurmala, Latvia. Jan, Wil, Michael, and many others kindly integrated me and our circuit simulation group at TKK into their co-operation network. My first SCEE conference was SCEE 2006 in Sinaia, Romania. There, at the nice conference dinner event, I still remember being gradually "hypnotized" by the warm atmosphere, good food, wine, and the spontaneous dance show of female Romanian PhD students. Then, at the right moment, Jan and Will asked me, to my big surprise, if I and my colleagues could organize the SCEE 2008 conference in Finland. After the brief storm in my brain settled a little, I replied that on my return to Finland I would ask my professor Martti Valtonen if he would show the green light for this venture. Martti generously gave me his full support and organizing effort, and some days after the SCEE 2008 was to be held in Finland.

The SCEE 2008 committees are given below. Please note that the titles and affiliations of the people listed are as they were in 2008. The Program Committee consisted of Prof. Gabriela Ciuprina (Politehnica University of Bucharest, Romania), Dr. Georg Denk (Qimonda, Germany), Prof. Michael Günther (Bergische Universität Wuppertal, Germany), Dr. Jan ter Maten (NXP Semiconductors, The Netherlands), Dr. Bastiaan Michielsen (ONERA, France), Prof. Ursula van Rienen (University of Rostock, Germany), Prof. Vittorio Romano (University of Catania, Italy), Dr. Janne Roos (Helsinki University of Technology, Finland), Prof. Wil Schilders (TU Eindhoven & NXP Semiconductors, The Netherlands), and Prof. Thomas Weiland (TU Darmstadt & CST, Germany).














The Scientific Advisory Committee consisted of Dr. Andreas Blaszczyk (ABB Corporate Research, Switzerland), Prof. Roland Freund (University of California, Davis, USA), Dr. Francois Henrotte (IEM RWTH, Germany), Prof. Ralf Hiptmair (ETH Zürich, Switzerland), Prof. Daniel Ioan (Politehnica University of Bucharest, Romania), Prof. Lauri Kettunen (Tampere University of Technology, Finland), Prof. Wolfgang Mathis (Leibniz Universität Hannover, Germany), Dr. Irina Munteanu (Computer Simulation Technology, Germany), Prof. Jan Sykulski (University of Southampton, United Kingdom), and Prof. Caren Tischendorf (Universität zu Köln, Germany).

The Local Organizing Committee consisted of Dr. Janne Roos, (*chairman*, TKK/RAD), Mr. Luis Costa (*secretary*, TKK/RAD), Prof. Martti Valtonen (TKK/RAD), Mr. Mikko Honkala (TKK/RAD), Mr. Jan Fagerström (TKK), Mr. Vesa Linja-aho (TKK), Ms. Jenni Tulensalo (TKK), Ms. Tuija Karviala (Congreszon), and Ms. Katri Luomanpää (Congreszon).

The conference topics were the following:

Computational Electromagnetics (CE), CAD/EDA tools and techniques; Modelling and parameter extraction; Discretization and solution methods: BEM, FEM, FDTD, FIT, FDS, PEEC, TLM, MoM, etc.; Applications: antennas, microwaves, interconnects, on-chip passives, electrical machines, etc.

- Circuit Simulation (CS), CAD/EDA tools and techniques; Modelling: passive, device, compact, behavioural, symbolic, etc.; Simulation: DC, AC, transient, HB, envelope, noise, etc.; Model-order reduction; Applications: RF communication systems, power electronics, etc.
- Coupled Problems (CP), Multi-physics modelling and simulation: electrical/thermal/mechanical, substrate coupling, etc.; Co-simulation: EM-circuit, circuit-system, analog-digital, etc.; Applications: interconnects, electromagnetic compatibility, bioengineering, MEMS, etc.
- Mathematical and Computational Methods (CM), Differential equations: PDEs and DAEs; Solution methods for large linear systems; Multi-scale schemes; Parallel/grid computing; Optimization, space mapping, inverse problems, etc.

SCEE 2008 was honoured by the presence of 10 invited speakers:

- Dr. Sergey Yuferev (Nokia, Finland), [CE] Challenges and approaches in EMC/EMI modeling of wireless devices
- **Prof. Jan Hesthaven** (Brown University, USA), [CE] *High*order discontinuous Galerkin methods for computational electromagnetics and uncertainty quantification
- Prof. Peter Benner (TU Chemnitz, Germany), [CS] Advances in balancing-related model reduction for circuit simulation





Getting acquainted with the medieval city of Porvoo



- Prof. Qi-Jun Zhang (Carleton University, Canada), [CS] ANN/DNN-based behavioral modeling of RF/microwave components/devices and circuit blocks
- Dr. Emira Dautbegovic (Qimonda, Germany), [CS] Wavelets in circuit simulation
- **Prof. Daniel Ioan** (Politehnica University of Bucharest, Romania), [CS/CP] *Parametric reduced-order models for passive integrated components coupled with their EM environment*
- **Dr. Wim Schoenmaker** (MAGWEL, Belgium), [CP] *Evaluation* of the electromagnetic coupling between microelectronic device structures using computational electrodynamics
- **Prof. Ansgar Jüngel** (TU Wien, Austria), [CP] *Thermal effects in coupled circuit-device simulations*
- **Dr. David Levadoux** (ONERA, France), [CM] *New trends in the preconditioning of integral equations of electromagnetism*
- Dr. Galina Benderskaya (CST, Germany), [CM] Numerical time integration in computational electromagnetics

In addition, there were 33 oral presentations and 44 poster presentations.

The social programme began with a welcome cocktail in the main building of TKK on the evening of the eve of the conference, where wine and snacks were served. On the evening of the first day of the conference, Espoo City hosted a reception at the Espoo Cultural Centre, where Ms. Jaana Tuomi, the Managing Director of the city's Visit Espoo unit, made a welcome speech followed by a dinner buffet.

The conference banquet was held in conjunction with an excursion to a scenic region to the east of Helsinki. The first stop of the excursion was Söderkulla Manor, a historically and architecturally notable estate, situated in the scenic Sipoonjoki river valley between Helsinki and Porvoo, a town some 50 km to the east of Helsinki. The estate was established in 1557, and the current main building, built in the Art Nouveau style, was completed in 1908. Coffee and cinnamon rolls (pulla in Finnish) were served in the main building. The next stop was the centre of Porvoo. Our guides walked us through the Old Town, a charming medieval area with cobblestone streets and red ochre sheds with lots of antique and handicraft shops along its idyllic narrow streets. We saw, for example, the Town Hall Square and the ruins of the Medieval Cathedral. We also had some "free time" to walk and shop by ourselves. The climax of the excursion, our final stop, was Haikko Manor, where we enjoyed a three-course dinner.

The post-conference book *Scientific Computing in Electrical Engineering SCEE 2008* was dedicated to the memory of Professor Angelo Marcello Anile (3.1.1948 – 16.11.2007) from Catania, Sicily, Italia. Dr. Giuseppe Ali, Prof. Michael Günther, and Prof. Vittorio Romano, who were Marcello's students, friends and colleagues, kindly wrote the obituary. The other contents of the book comprise five parts: the four topics of the conference, computational electromagnetics, circuit simulation, coupled problems and mathematical and computational methods, as well as an additional topic modelorder reduction. Each of the parts begins with an introductory text. In all, the book contains 65 full papers.

We (Janne & Luis) would like to thank the SCEE community for trusting that our former group at TKK/RAD could organize the SCEE 2008 conference. As many of you well know, organizing a conference for nearly 100 people requires a massive effort, but it is also a very rewarding experience. After SCEE 2008, we participated in the SCEE 2010 conference in Toulouse, France. However, since then, we have changed our jobs and



Editors: Janne Roos, Luis R.J. Costa Springer series: Mathematics in Industry (Volume 14) - Published in 2010 -

institutions and, thereby, withdrawn from the SCEE community. Writing this chapter was a good opportunity for us to recall all the good memories associated with SCEE. We wish the SCEE community all the best and a successful SCEE 2022 conference in Amsterdam, The Netherlands!













TOULOUSE, FRANCE | SEPTEMBER 20 - 24

SCEE 2010

BAS MICHIELSEN, JEAN-RENÉ POIRIER

The eighth international SCEE conference, held in Toulouse, France, was organized by Onera (The French aerospace laboratory www.onera.fr), in close collaboration with the ENSEEIHT (www.enseeiht.fr). The ENSEEIHT, situated in the heart of Toulouse, provided the Lecture hall for plenary sessions and space for the poster session. This allowed participants to have their lodging at walking distance from the conference.

SCEE 2010 was further sponsored by:

- ABB, Swtitzerland (www.abb.com)
- AWR, Finland (http://web.awr.com)
- MunEDA, Germany (www.muneda.com)
- CST, Germany (www.cst.com)

The Program Committee consisted of: Andeas Blaszcyk (ABB, Switzerland), Gabriela Ciuprina (Politehnica University of Bucharest, Romania), Georg Denk (Infineon, Germany), Michael Günther (University of Wuppertal, Germany), Jan W. ter Maten (NXP Semiconductors, The Netherlands), Bastiaan Michielsen (Onera, France), Ursula van Rienen (Universität Rostock, Germany), Vittorio Romano (Università di Catania, Italy), Janne Roos (Helsinki University of Technology, Finland), Wil Schilders (TU Eindhoven, The Netherlands), Thomas Weiland (TU Darmstadt & CST, Germany).

The conference themes

In the 2010 edition of the SCEE conference, five conference themes had been identified. For each of the five conference themes, we had invited speakers. The following table presents the invited contributions in order of appearance in the conference book.

Mathematical methods:

- **Tim Davis** (University of Florida, USA), Sparse matrix methods for Circuit Simulation Problems
- Helmut Gräb (TU München, Germany), From Sizing over Design Centering and Pareto Optimization to Tolerance Pareto Optimization of Electronic Circuits

Computational Electromagnetics:

- Guillaume Sylvand (EADS IW, France), From Quasi-Static to High Frequencies: An Overview of Numerical Simulation at EADS
- Patrick Dular (Université de Liège, Belgium), Magnetic Model Refinement via a Coupling of Finite Element Subproblems
- Jörg Ostrowski (ABB, Switzerland), Transient Full Maxwell Computation of Slow Processes















Coupled Problems:

• Maurizio Repetto (Ploitecnico Turin, Italy), *Tonti Diagrams* and Algebraic Methods for the Solution of Coupled Problems

Circuit and Device Modelling and Simulation:

• Heidi Thornquist (Sandia Labs., USA), Advances in Parallel Transistor level Circuit Simulation

Model Order Reduction:

• Joost Rommes (NXP, The Netherlands), Challenges in Model Order Reduction for Industrial Problems

The poster sessions play an important role in the SCEE conferences,. Authors presented a summary of their poster in dedicated plenary sessions.

The authors of some 47 contributions, including the invited speakers, had been invited to contribute a chapter to the conference book. This conference book has been published by Spinger as volume 16 of their "Mathematics in Industry" series. The SCEE 2010 book, has been in the 25% most downloaded Springer editions for several years. A visit to Albi, with its "St. Cécile" cathedral freshly classified as UNSCO World Heritage Site, started the conference outing. The conference dinner took place in "Château LaBastidié" in the well-known Gaillac region south of Albi. The owner of the Château welcomed us with technical explanations on wine making and tasting. During dinner, things got really serious. The number of glasses on the table was very promising indeed and we could test our "connoisseur" status by filling out a quiz. Luckily, the patron was very willing to help us finding the right answers.



Editors: Bastiaan Michielsen, Jean-René Poirier Springer series: Mathematics in Industry (Volume 16) - Published in 2012 -







ZÜRICH, SWITZERLAND | SEPTEMBER 11 - 14

SCEE 2012

ANDREAS BLASZCZYK, RALF HIPTMAIR, PASCAL LEUCHTMANN, JÖRG OSTROWSKI

The Zürich edition of the SCEE took place in September 2012 at the Swiss Federal Institute of Technology, ETH, with almost 100 participants. Most of them came from Switzerland and other European countries, with a very high number of attendees from industry. There were 8 invited speakers, 35 talks of regular participants, and 35 posters. The presentations were very broadly covering the entire field of scientific computing in electrical engineering. Topics of particular interest, with a high number of related presentations, were reduced order modeling, uncertainty quantification, and simulations of electrical machines.

These topics were also excellently covered in the following invited talks:

- Karl Meerbergen gave a presentation on Model order reduction for PDE constrained optimization in vibrations,
- Olivier Le Maitre showed Stochastic Spectral Methods for Uncertainty Propagation in Numerical Models,
- **Utz Wever** spoke about *Uncertainty Quantification from an Industrial Perspective*.

At the ABB research center in Baden-Dättwil, both ABB and CST were sponsors of SCEE 2012. Didier Cottet and Thorsten Steinmetz are looking forward to their presentations. Sebastian Schöps quantifies the uncertainty of inrush currents in electrical machines. The fountain at the entrance of the ABB research center.

Naturally, simulations of electrical machines were intensively discussed on the industry day, that took place at ABB Corporate Research in Baden-Dättwil. This center of industrial research is located 20 km west of Zürich. It was found in 1967 and is one of the major research centers of the Swiss-Swedish company ABB, with about 200 employees at the time of the conference. For the first time the SCCE-sessions have been performed on the premises of an industrial company. The participants arrived by bus, after a short journey from Zürich, and were welcomed by the director.



SCEE 2012

Eidgenössische Technische Hochschule Zürich Swiss Federal Institute of Technology Zurich









Andreas Blaszczyk and Thomas Weiland award Irene Hiltunen for her outstanding contribution

Scientific computation of electromagnetic phenomena is a focus of research at this center. Examples of such kind of simulation projects were given by

- Didier Cottet, who talked about *Electromagnetic Simulations in Power Electronic Converter Design*, as well as
- Thorsten Steinmetz, who showed his Numerical Simulations for Power and Distribution Transformers.

Beside the presentations, a visit of the ABB laboratories was organized. Experiments in these labs are conducted to support the development of novel products. Clearly this day was very successful in bringing together scientists from academia and industry, as it was the idea of the SCEE series of conferences from its foundation.

After the lab tour, the conference dinner took place at the Schloss Wildegg, a castle that was built in the first half of the 13th century during the reign of the Habsburg family. Wildegg Castle is famous for its gardens. In the Baroque kitchen garden and pleasure garden, almost forgotten plants and rare vegetables are cultivated. The rose garden is a place of peace and quiet, with its historic shrub and climbing roses. So, the participants took the chance to socialize and network in this beautiful environment. Even some of the members of the organizing committee found a while to relax among the extraordinary plants. The highlight of the evening was the award ceremony for the "SCEE Young Scientist Award", which was given to Irene Hiltunen for her paper and presentation on *Broad Band Surface Impedance Boundary Conditions for Higher Order Time Domain Discontinous Galerkin Method*.



The organizing comimittee: Andreas Blaszczyk, Ralf Hiptmair, Jörg Ostrowski and cannabis plants in the garden of Wildegg Castle



WUPPERTAL, GERMANY | JULY 22 - 25

SCEE 2014

ANDREAS BARTEL, MARKUS CLEMENS, MICHAEL GÜNTHER, E.JAN W. TER MATEN

From July 22 until July 25, 2014, the 10th International Conference on "Scientific Computing in Electrical Engineering" (SCEE) was held in Wuppertal, Germany. It was jointly organized by the Chair of Applied Mathematics and Numerical Analysis (Prof. Michael Günther, Dr. Andreas Bartel and Dr. Jan ter Maten and the Chair of Electromagnetic Theory (Prof. Markus Clemens and Carsten Cimala), Bergische Universität Wuppertal.

Selection of oral talks and poster presentations, as well as invitation of invited speakers, was task of the Scientific Committee, consisting of

- Prof. Gabriela Ciuprina, Politehnica University of Bucharest, Romania
- Dr. Georg Denk, Infineon, Germany
- Prof. Michael Günther, University of Wuppertal, Germany
- Prof. Stéphane Lantéri, INRIA, France
- Dr. Jan ter Maten, University of Wuppertal, Germany
- Dr. Jörg Ostrowski, ABB, Switzerland
- Prof. Ronan Perrussel, Toulouse, France
- Prof. Ursula van Rienen, University of Rostock, Germany
- Prof. Vittorio Romano, University of Catania, Italy
- Prof. Wil Schilders, TU Eindhoven, The Netherlands
- Prof. Thomas Weiland, TU Darmstadt & CST, Germany

Due to a generous donation, we were able to use the beautiful Historische Stadthalle Wuppertal as our conference venue: a remarkable building in Wilhelminian style, which was inaugurated in 1900. There we welcomed our participants in the Offenbach Saal for all our talks, and we had registration, poster sessions, conference cafe, and personal meetings in the impressive Wandelhalle.

The tenth edition of the SCEE brought together more than 90 scientists from the fields of applied mathematics, electrical engineering, and the computer sciences as well as scientists from industry. Again, it created an excellent working atmosphere, especially due to its unique workshop character, where all talks and poster introductions were presented in the plenary. In addition, we had very clear talks and poster presentations, lively and fruitful discussions, and a great deal of personal networking.

We had a large variety of different talks from excellent invited scientists representing both academia and industry, including an inspiring opening talk by Stéphane Clénet.



Berg and is today the landmark of the Bergisches Land region



Müngstener Brücke (Solingen): 107 Meter high and 500 Meter long, spanning over the narrow Wupper valley



Our keynote speakers were (in alphabetical order):

- **Piergiorgio Alotto** (Università di Padova, Italy), Parallelization and Sparsification of a Surface-Volume Integral Code for Plasma-Antenna Interaction
- **Stéphane Clénet** (Arts & Métiers ParisTech, France), Approximation Methods to Solve Stochastic Problems in Computational Electromagnetics
- Andreas Frommer (University of Wuppertal, Germany),
 Computing f (A)/b: The Action of a Matrix Function on a Vector
- Daniel Klagges (Kostal GmbH & Co. KG, Germany), Simulation of Power Electronics in Automotive Product Development
- Antonino La Magna (CNR Catania, Italy), Graphene Nanodevice Design from First Principles Calculations
- Markus Pistauer (CISC Semiconductor GmbH, Austria), High-Level Simulation of Cyber-Physical Systems
- Joost Rommes (Mentor Graphics, France), Different Views on Model-Order Reduction for the Electronics Industry
- Sebastian Schöps (TU Darmstadt, Germany), Iterative Schemes for Coupled Multiphysical Problems in Electrical Engineering

The topics above are representative of the conference's range. From Tuesday to Friday, we had a total of 30 oral presentations. And in two sessions, 24 posters were presented and discussed.

The contributions had been divided into five parts, which reflect the main focus areas of the SCEE 2014:

- Device Modeling, Electric Circuits, and Simulation
- Computational Electromagnetics
- Coupled Problems
- Model-Order Reduction
- Uncertainty Quantification

A special highlight of the SCEE 2014 was our conference excursion to the nearby Wupper valley. Starting at the "Müngstener Brücke" bridge, we went on a small hike, following the river to "Schloss Burg." Visiting the charming residence of the "Counts of Berg," we were told the history of the region "Bergisches Land" and enjoyed a joint dinner, where many ideas and new research directions were discussed.

As usual, the proceedings were published by Springer within the ECMI subseries of Mathematics in Industry: Bartel A., Clemens M., Günther M. and ter Maten E. J. W.: *Scientific Computing in Electrical Engineering (Berlin 2016: Springer, 256 pages; volume 23 of the ECMI subseries of Mathematics in industry)*

A selection of papers had been invited for a special issue of the Springer Journal Mathematics in Industry.



Editors: Andreas Bartel, Markus Clemens, Michael Günther, E.Jan W. ter Maten Springer series: Mathematics in Industry (Volume 23) - Published in 2016 -



ST. WOLFGANG - STROBL, AUSTRIA | OCTOBER 3 - 7

SCEE 2016

ULRICH LANGER, WOLFGANG AMRHEIN, WALTER ZULEHNER

The 11th International Conference on "Scientific Computing in Electrical Engineering" (SCEE) was held at the Federal Institute for Adult Education (BIFEB - Bundesinstitut für Erwachsenenbildung) in St. Wolfgang/Strobl, Austria, from October 3 to October 7, 2016. The SCEE 2016 was jointly organized by the doctoral program "Computational Mathematics" and the Institute of Computational Mathematics at the Johannes Kepler University Linz, the Linz Center of Mechatronics GmbH, and the Johann Radon Institute for Computational and Applied Mathematics (RICAM) at the Austrian Academy of Sciences.

With more than 80 scientists from 15 countries participating, the con-ference brought together applied mathematicians and electrical engineers, academics and industry



practitioners, and, last but not least, different com- munities, namely those working in electromagnetic field computation and those working in circuit and device simulation. The BIFEB creates an in- spiring, "Oberwolfach-like" working atmosphere. All talks and the poster introductions were presented in the plenary session in order to avoid split- ting up the different communities mentioned above. This led to fruitful discussions both within and across the communities; see Figure 1.

The scientific committee invited 8 experts to give keynote presentations on the main topics in the regular program. Our keynote speakers were (in alphabetical order):

- Ram Achar (Ottawa, Ontario, Canada), Challenges and Opportunities: Modeling and Simulation for the Emerging High-Speed Multi-function Designs
- Peter Benner and Lihong Feng (Magdeburg, Germany), Parametric model order reduction for ET simulation in nanoelectronics
- Hans-Georg Brachtendorf (Hagenberg, Austria), Coupled Multirate Simulation by the MPDE technique for Radio Frequency Circuits
- Carlo de Falco (Milano, Italy), *Numerical Modeling of Organic Elec- tronic and Photovoltaic Devices*



- Victorita Dolean (Glasgow, UK), Microwave Tomographic Imaging of Cerebrovascular Accidents by Using High-Performance Computing
- Eric Keiter (Albuquerque, USA), Gradient-Enhanced Polynomial Chaos Methods for Circuit Simulation
- Roland Pulch (Greifswald, Germany), Global sensitivity analysis for parameter variations in electric circuits
- Joachim Schöberl (Vienna, Austria), Mapped Tent-pitching methods for Maxwell Equations

Moreover, we organized an industrial day where 5 scientists from indus- try presented challenging industrial problems and discussed their solution. These speakers were (in alphabetical order):

- Massimiliano Cremonesi (Polimi, Milano, Italy), A Lagrangian Finite Element approach for the simulation of a vacuum arc
- Lars Kielhorn (TailSiT GmbH, Graz, Austria), A Symmetric FEM- BEM Formulation for Magnetostatics
- Stefan Reitzinger (CST, Darmstadt, Germany), Broadband Solution Methods for Maxwell's Equations in Laplace Domain
- Ehrenfried Seebacher (austriamicrosystems, Unterpremstätten, Austria), *Compact Modeling for HV CMOS Technologies*
- Siegfried Silber (LCM GmBH, Linz, Austria), Optimization of mecha- tronic components with MagOpt.

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In addition to the invited keynote talks, there were also 19 contributed talks. 26 posters were presented and discussed in two poster sessions; the first poster session was devoted to applications including industrial applications, while the second poster session collected posters presenting new computa- tional methods. Each session started with a fastforward presentation of the posters by one of the authors.

For our excursion on Wednesday, we planned to visit the "Five Fingers" on Krippenstein mountain and Hallstatt town and lake. However, weather conditions were so bad that we had to visit the "Giant Ice Cave" near Hallstatt instead; see Figures 2 and 3. We took the first section of the cable car to Krippenstein, then walked for 20 min to the cave, where we had an hour-long guided tour before returning to the BIFEB – without getting too wet.

Ulrich Langer, Wolfgang Amrhein, and Walter Zulehner edited the SCEE 2016 proceedings *Scientific Computing in Electrical Engineering, SCEE 2016, St. Wolfgang, Austria, October 2016* which were published in the Springer Series *Mathematics in Industry*, volume 28, 2018.

The contributions to these proceedings are divided into six parts:

- Computational Electromagnetics,
- Circuit and Device Modelling and Simulation,
- Coupled Problems and Multi-Scale Approaches in Space and Time,
- Mathematical and Computational Methods Including Uncertainty Quantification,
- Model Order Reduction,
- Industrial Applications.



Editors: Ulrich Langer, Wolfgang Amrhein, Walter Zulehner Springer series: Mathematics in Industry (Volume 28) - Published in 2018 -

The editors very much hope that this collection of papers will be of interest to many applied mathematicians and electrical engineers working at univer- sities and research institutions as well as to scientists working in industry. We would like to thank all participants for their valued contributions to the SCEE 2016 and, in particular, we are grateful to the authors of the papers published in these proceedings.



TAORMINA, ITALY | SEPTEMBER 23 - 27

SCEE 2018

VITTORIO ROMANO

The 12th International Conference Scientific Computing in Electrical Engineering was organized by the Group of Applied Mathematics at the University of Catania (www.unict.it), Italy, jointly with the Interdepartmental Center of Mathematics for Technology "A. M. Anile" (CIMAT) (http://cimat.unict.it). It was held in the period September 23-27, 2018 in Taormina, Italy, a charming town on a cliff by the sea on the east coast of the island of Sicily, with a mythical atmosphere spread all around which has enchanted visitors from all over the world for years and years. The conference site was Hotel Villa Diodoro.

SCEE 2018 had the financial support from the Department of Mathematics and Computer Science, University of Catania (www.dmi.unict.it), and from the Gruppo Nazionale di Fisica Matematica (GNFM) (www.altamatematica.it/gnfm/). A special sponsorship was given by Associazione Angelo Marcello Anile (ASSOAMA) (www.assoama.it) which very generously supported the conference.

The chairs of the conference were Vittorio Romano and Giuseppe Nicosia. The scientific committee was formed by Gabriela Ciuprina, Hebert de Gersem, George Denk, Michael Günther, Ulrich Langer, Jan ter Maten, Jörg Ostrowski, Ursula van Rienen, Vittorio Romano, Ruth Sabariego, Wil Schilders, Caren Tishendorf. Salvatore Alfonzetti, Armando Majorana, Orazio Muscato, Giuseppe Nicosia, Vittorio Romano, Rita Tracinà, Marco Coco, Liliana Luca, Giovanni Nastasi constituted the local organising committee.















The main topics of the conference comprised:

- Computational electromagnetics,
- Circuit and device modeling and simulation,
- Coupled problems and multi-scale approaches in space and time,
- Mathematical and computational methods including uncertainty quantification,
- Model order reduction,
- Industrial applications.

With respect to the previous editions, a greater number of contributions in device modeling and simulation were submitted.

The scientific program included invited and contributed talks, poster sessions and an industrial day. More than 60 scientists from several countries attended SCEE 2018.

Nine invited speakers covered all the subjects of the conference with inspiring and visionary presentations (in alphabetical order):

- Bilen Emek Abali (Technische Universität Berlin), Modeling mechanochemistry in Li-ion batteries
- Matthias Auf der Maur (University of Rome Tor Vergata), Current developments in device simulation: degeneracy, arbitrary density of states and multi-particle drift-diffusion
- Tonio Biondi (Maxim Integrated, Catania), Data Center Power
- **Steffen Börm** (University of Kiel), *GCA-H² matrix compression* for electrostatic simulations
- Peter Gangl (Technische Universität Graz) Topology and Shape Optimization of Electrical Machines
- Jay Gopalakrishnan (Portland State University), *Techniques* for modeling fiber laser amplifiers;

- Sarah Grundel (Max Planck Institute Magdeburg), Simulation and Model Order Reduction of Power Systems
- Tudor Ionescu (University Politehnica of Bucharest), Model reduction for nonlinear systems – a time-domain moment matching perspective
- **Omar Morandi** (University of Florence), *Description of the trajectories of quantum particles by a Quantum Lagrangian approach*

In addition, there have been 26 oral contributed talks, selected by the scientific committee, and 22 posters. More details can be found on the webpage of the conference (https://scee2018.icas.xyz).

The scientific program was completed with a social tour through the streets of Taormina and a visit to the magnificent ancient Greek-Roman theater.

The proceedings, after a regular peer-review process, were published in a book of the Springer series on Mathematics in Industry dedicated to the SCEE conferences. The contributions were divided into five parts according to the specific investigated subject. A selection of papers related to SCEE 2018 was published in a special issue of COMPEL.



Editors: Giuseppe Nicosia, Vittorio Romano Springer series: Mathematics in Industry (Volume 32) - Published in 2020 -







successful, leading to many discussions









EINDHOVEN, THE NETHERLANDS | FEBRUARY 16 - 20

SCEE 2020

WIL SCHILDERS, MARTIJN VAN BEURDEN, NEIL BUDKO

The 13th SCEE was held in Eindhoven, the Netherlands, in 2020. It was organized by Eindhoven University of Technology and Delft University of Technology. The location that was chosen was the Academisch Genootschap in Eindhoven, at walking distance from the railway station and the city centre (https://ag-eindhoven.nl/). For many participants, it would be the last conference they could physically attend for the coming two years, as shortly after the world was engulfed by the Covid-19 pandemic and lockdowns were introduced by many governments.

SCEE 2020 was sponsored by Eindhoven University of Technology (www.tue.nl/), Delft University of Technology (www.tudelft.nl), The Dutch Research Council NWO (https://nwo.nl), ROMSOC (www.romsoc.eu), CST (www.3ds.com/products-services/simulia/products/cststudio-suite/), 4TU.AMI (www.4tu.nl/ami/en/), NDNS+ (www.ndns.nl/), and ECMI (https://ecmiindmath.org/).

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, Application: co-simulation, electromagnetic compatibility, bio-engineering,

Mathematical and Computational Methods Inverse problems, Optimization, Multi-scale schemes, Solutions methods for large linear systems, Differential-Algebraic equations, Grid computing, Parallel Computing.

The Program Committee consisted of: Wil Schilders (TU Eindhoven, chair), Neil Budko (TU Delft), Martijn van Beurden (TU Eindhoven), Gabriela Ciuprina (Polytechnic University of Bucharest), Georg Denk (Infineon), Herbert de Gersem (TU Darmstadt), Michael Günther (University of Wuppertal), Stefan Kurz (Bosch & TU Darmstadt), Ulrich Langer (Johannes Kepler University Linz), Jan ter Maten (University of Wuppertal), Jörg Ostrowski (ABB), Ursula van Rienen (Rostock University), Vittorio Romano (University of Catania), Ruth V. Sabariego (KU Leuven), Sebastian Schöps (TU Darmstadt), Caren Tischendorf (Humboldt University Berlin).



SCEE 2020 was honoured by the presence of the following invited speakers:

- Albert Ruehli (IEEE life fellow, 50 years IBM, Missouri University of Science and Technology, USA), *Retrospective:* 50 years of circuit and electromagnetic solutions
- Jasmin Smajic (ETH Zürich, Switzerland), Numerical Analysis of Electromagnetic Transients in Power Devices
- Romanus Dyczij-Edlinger (Universty of Saarland, Germany), Reduced-order finite-element modeling and optimization of antennas
- Liliana Borcea (University of Michigan, USA), Reduced order model approach for inverse scattering
- Slawomir Koziel (Reykjavik University, Iceland), Forward and Inverse Surrogate Modeling for Accelerated Design Optimization of High-Frequency Structures

Another feature of this conference was the Industry Morning, where 3 renowned speakers from industry gave very nice presentations on urgent topics within the electronics industry:

• Rick Janssen (NXP Semiconductors), *Electromagnetic Simulation Challenges in the Semiconductor Industry*

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- Frank Buijnsters (ASML), Efficient Maxwell solvers for optical semiconductor metrology
 - **Stefan Kurz** (Bosch), Newton-Kepler-Bosch: Towards the Next Level of Scientific Computing in Engineering



In addition to these talks, we had a total of 30 oral presentations and 30 poster presentations, completed with 2 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. A special highlight of the SCEE 2020 conference were the excursions to either the Philips museum or the DAF museum. Both companies have been instrumental in building up the city of Eindhoven, and the collections of these museums were enjoyed by the participants. After this excursion, the conference dinner took place in the Academisch Genootschap Eindhoven, where many ideas and new research directions were discussed in parallel to the enjoyment of good food and wine.

The conference dinner was held in the Academisch Genootschap Eindhoven. The dinner for the invited speakers and the programme committee was held in one of the best restaurants in Eindhoven, "Karpendonkse Hoeve". This restaurant has always been very popular also with Philips directors. For us, organizing SCEE 2020 took quite some effort, but it was worth it. It was only one month later that we all got to fully appreciate how special it is to meet international colleagues and discuss our research, projects, and related activities in a face-to-face setting. With a lot of hard work after the conference, the proceedings were published the next year, in 2021. 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.



Editors Martijn van Beurden, Neil Budko, Wil Schilders Springer series: Mathematics in Industry (Volume 36) - Published in 2021 -



New topics

Besides the conventional topics in scientific computing, like model order reduction, a new topic emerged: scientific machine learning. It is an exciting new research area, combination of scientific computing and machine learning techniques like neural networks, inspired by the availability of relatively large amounts of measured data. In this way, much more accurate modelling can be done. It could help us, for example, in providing more accurate mobility and recombination models in semiconductor device simulation. For a nice introduction to scientific machine learning, see the booklet that was produced for a workshop in the Lorentz Center in November 2021: https://platformwiskunde.nl/wp-content/ uploads/2021/11/Math_KET_SciML.pdf



SCEE 2022

HARSHIT BANSAL, RUXANDRA BARBULESCU, NEIL BUDKO, GABRIELA CIUPRINA, MARTIJN VAN BEURDEN, WIL SCHILDERS

The 14th International Conference on Scientific Computing in Electrical Engineering was held from July 11 – 14, 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, 1997.

SCEE 2022 was sponsored by Eindhoven University of Technology (www.tue.nl), CWI (https://www.cwi.nl/), Platform Wiskunde Nederland (https://platformwiskunde.nl/), 4TU.AMI (www.4tu.nl/ami/), ABB (https://global.abb/group/en), NDNS+ (www.ndns.nl/), ECMI (Special Interest Group – Modelling, Simulation, and Optimization in Electrical Engineering; https://ecmiindmath.org/, https://ecmiindmath. org/special-interest-groups/modeling-simulation-andoptimization-in-electrical-engineering-msoee/), and ROMSOC (www.romsoc.eu). 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, Application: co-simulation, electromagnetic compatibility, bio-engineering,

Mathematical and Computational Methods Inverse problems, Optimization, Multi-scale 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).











The Program Committee consisted of: Wil Schilders (TU Eindhoven, chair), Neil Budko (TU Delft), Martijn van Beurden (TU Eindhoven), Gabriela Ciuprina (Polytechnic University of Bucharest), Georg Denk (Infineon), Herbert De Gersem (TU Darmstadt), Michael Günther (University of Wuppertal), Stefan Kurz (Bosch), Ulrich Langer (Johannes Kepler University Linz), Jan ter Maten (University of Wuppertal), Jörg Ostrowski (ABB), Ursula van Rienen (Rostock University), Vittorio Romano (University of Catania), Ruth V. Sabariego (KU Leuven), Sebastian Schöps (TU Darmstadt), Caren Tischendorf (Humboldt University Berlin).

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

Another feature of this conference was the Industry Morning, where 3 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
- Joerg Ostrowski (ABB), Research within ABB

In addition to these talks, we had a total of 33 oral presentations and 26 poster presentations, completed with 2 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 organisers, 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 July 11-14, 2022, in anticipation that the situation will be better. We were finally able to have a great and enjoyable in-person conference in the summer of 2022. A lot of hard work is yet to be put in, the proceedings will be published the next year, 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.



Colophon

Idea Wil Schilders Editors Wil Schilders, Harshit Bansal, Ruxandra Barbulescu Designer of the map Ruxandra Barbulescu Design WAT Ontwerpers, Utrecht Printing Leesterheide Grafisch

Thanks to all contributors to this booklet, especially all organisers of the SCEE conferences held so far.





At SCEE 2022, the 25th anniversary of SCEE was celebrated. This series of conferences continues to bring together mathematicians, computer scientists, and engineers from research institutes, universities, and industry who work on: Computational Electromagnetics, Circuit Simulation and Design, Coupled Problems, Mathematical and Computational Methods. The mixture of researchers from these disciplines has been very successful, and in this sense SCEE has absolutely fulfilled its promise. In this booklet, we review all editions from 1997 till 2022, including information about the technical program, the organization, and with many photographs.