



Contents lists available at ScienceDirect

# Journal of Computational and Applied Mathematics

journal homepage: [www.elsevier.com/locate/cam](http://www.elsevier.com/locate/cam)

## Preface

# Numerical Solution of Differential and Differential–Algebraic Equations. Selected Papers from NUMDIFF-15



This special issue contains a selection of papers presented at the 15th Seminar NUMDIFF on the Numerical Solution of Differential and Differential–Algebraic Equations, held at the Martin Luther University of Halle-Wittenberg, Halle, Germany, during 3–7 September 2018. This conference was jointly organized by Martin Arnold (Halle), Elena Celledoni (Trondheim), Jason Frank (Utrecht), Jens Lang (Darmstadt), Helmut Podhaisky (Halle) and Rüdiger Weiner (Halle).

With an attendance of 143 scientists, NUMDIFF-15 encompassed a scientific programme with twelve plenary invited lectures, four mini-symposia with a total of twenty-eight invited lectures, and a variety of contributed lectures.

The subjects of the mini-symposia were:

- Computational mechanics and geometric numerical integration.  
Organizers: Sigrid Leyendecker (Friedrich-Alexander-Universität Erlangen-Nürnberg) and Klas Modin (Chalmers University of Technology, Gothenburg).
- Model order reduction for dynamical systems.  
Organizer: Michael Hinze (University of Hamburg).
- Numerical methods for stochastic (partial) differential equations.  
Organizer: Gilles Vilmart (University of Geneva).
- Piecewise smooth differential equations.  
Organizers: Luca Dieci (Georgia Institute of Technology, Atlanta) and Nicola Guglielmi (Gran Sasso Science Institute, L'Aquila).

The twelve plenary invited lectures were:

- Exponential integrators for stochastic partial differential equations, David Cohen (Umeå University).
- Time stepping methods with forward a posteriori error estimation, Emil Constantinescu (Argonne National Laboratory).
- Is optimal really good in domain decomposition? (or why multigrid coarse spaces might not be suitable), Martin J. Gander (University of Geneva).
- Some aspects of the time integration of multidimensional parabolic problems with mixed derivatives, Severiano Gonzalez-Pinto (University of La Laguna).
- A localized reduced-order modeling approach for PDEs with bifurcating solutions, Max Gunzburger (Florida State University).
- Domain decomposition and parabolic problems – a time integrator approach, Eskil Hansen (Lund University).
- The method of (uncountably many) characteristics, David Ketcheson (KAUST).
- Adaptive time-space algorithms for the simulation of multi-scale reaction waves with error control, Marc Massot (CMAP Paris).
- Modified Patankar–Runge–Kutta schemes for conservative production–destruction equations, Andreas Meister (University of Kassel).
- Multilevel uncertainty quantification with sample-adaptive model hierarchies, Robert Scheichl (Heidelberg University).
- Variational models and partial differential equations for mathematical imaging, Carola-Bibiane Schönlieb (University of Cambridge).
- Time dependent stability: computation and applications, Erik Van Vleck (University of Kansas).

A special session at the conference was held in memory to the work and life of Willem Hundsdorfer (1954–2017) who has been an active participant of the NUMDIFF conferences for more than two decades and contributed to the

organisation of NUMDIFF-13, NUMDIFF-14 and NUMDIFF-15 as a member of the Scientific Committee. The memorial session was chaired by Karel in't Hout (University of Antwerp). We will remember Willem as a highly dedicated, modest and honest person with a fine humor, enjoyed and respected by his colleagues.

We thank all participants for their contributions to make NUMDIFF-15 a successful and interesting meeting. We gratefully acknowledge the editorial board of the Journal of Computational and Applied Mathematics for allowing us to publish the solicited papers in this special journal issue. All solicited papers were refereed in accordance with the journal's policy. This was possible only with the help and support of many colleagues who consented to serving as reviewers. We thank all of them for their time and efforts to ensure the quality of these proceedings. As organizers we gratefully acknowledge our sponsors for generously supporting the conference:

- Martin Luther University Halle-Wittenberg.
- Deutsche Forschungsgemeinschaft (DFG).

And we thank the University of Halle-Wittenberg for providing the venue of the meeting.

Martin Arnold  
Helmut Podhaisky  
Rüdiger Weiner  
*Martin Luther University Halle-Wittenberg, Germany*

Elena Celledoni  
*Norwegian University of Science and Technology Trondheim, Norway*

Jason Frank  
*Utrecht University, The Netherlands*

Jens Lang\*  
*Technische Universität Darmstadt, Germany*  
E-mail address: [lang@mathematik.tu-darmstadt.de](mailto:lang@mathematik.tu-darmstadt.de).

\* Corresponding editor.