Advances in Applied Mathematics 72 (2016) 1–3

Contents lists available at ScienceDirect

Advances in Applied Mathematics

www.elsevier.com/locate/yaama

Preface

Special issue on computational aspects of differential/difference algebra and integral operators

This special issue on *Computational Aspects of Differential/Difference Algebra and Integral Operators* arose from two special sessions, "Computational Differential and Difference Algebra" and "Algebraic and Algorithmic Aspects of Differential and Integral Operators", of the Applications of Computer Algebra conference (ACA), which took place at Fordham University in July 9–12, 2014. In those two special sessions, altogether 33 presentations were given, which was a record high for the field at that annual conference. Also the breadth of research directions exhibited by the presenters was unprecedented: novel and deep theoretical methods (resulting in new and more efficient algorithms), as well as concrete applied examples and software implementation. However, submissions to this special issue were not restricted to the presenters or participants of the two special sessions, and a wide research community announcement was made. The topics of the special issue include but are not limited to the topics of the special sessions.

The ACA track on *Computational Differential and Difference Algebra* was inaugurated in 2014, offering again a large session at the ACA 2015 in Kalamata, Greece. The *Algebraic and Algorithmic Aspects of Differential and Integral Operators Session* (AADIOS) was initiated by G. Regensburger and M. Rosenkranz at the ACA 2008 held in Hagenberg, Austria, running annually since then (intermediate meetings in Montréal 2009, Vlora 2010, Houston 2011, Sofia 2012, Malaga 2013). Since 2012 the AADIOS is co-organized with M. Barkatou and T. Cluzeau. Two proceedings volumes have been edited from the fruits of these meetings: an MCS Double Special Issue (Vol. 4, Nos. 2–3, 2010), based on the 2008–10 meetings, and the Springer LNCS volume 8372, based on the 2011–12 sessions.

Let us provide a *short overview of the contributions*. The paper by S. Rueda establishes a bridge between the differential elimination problem for systems of ordinary differential polynomials and the use of sparse algebraic resultants. In "Differential (Lie) algebras from a functorial point of view", L. Poinsot employs tools from universal algebra to construct the differential analog of the universal enveloping algebra for a given differ-

http://dx.doi.org/10.1016/j.aam.2015.09.017
0196-8858/© 2015 Elsevier Inc. All rights reserved.

ential Lie algebra. W. Li and Y. Li discuss new techniques in differential elimination, including differential Chow forms. In the paper by V. Gerdt and D. Robertz, differential Thomas decomposition is used for deriving all algebraically independent constraints on the initial data of mechanical and field-theoretical models with singular Lagrangians. The article by L. Guo, W. Keigher and S. Zhang investigates the relation between differential and Rota–Baxter algebras via the First Fundamental Theorem of Calculus from a categorical point of view. The paper "Dimension polynomials of difference local algebras" by A. Levin shows how the theory of dimension polynomials for difference field extensions can be extended to larger classes of difference rings. In the paper by L. D'Alfonso, G. Jeronimo and P. Solernó, an effective integrability criterion for differential-algebraic Pfaffian systems is obtained and applied to design a decision method of consistency for such systems. The article by A. Magid studies injective modules and homology for differential modules over a commutative differential algebra. J. Freitag and A. Minchenko study applications of model theory to differential algebraic groups, which serve as a tool for understanding differential algebraic relations among solutions of differential and difference equations.

Acknowledgments

It is our pleasure to thank the authors of submitted papers for all their efforts. We thank all external reviewers; without their diligent work a volume such as this would not be possible. Last but not least we thank Joseph Kung for his encouragement and support throughout the preparation of this special issue.

Moulay Barkatou
Thomas Cluzeau
University of Limoges; CNRS, XLIM UMR 7252, Limoges, France
E-mail addresses: moulay.barkatou@unilim.fr, cluzeau@ensil.unilim.fr

Alexey Ovchinnikov [*,1]
CUNY Queens College, 65-30 Kissena Blvd, Queens, NY 11367, USA
CUNY Graduate Center, 365 Fifth Avenue, New York, NY 10016, USA
E-mail address: aovchinnikov@qc.cuny.edu

Georg Regensburger [2]
Johann Radon Institute for Computational and Applied Mathematics (RICAM), Austrian Academy of Sciences, Linz, Austria
E-mail address: georg.regensburger@oeaw.ac.at

* Corresponding author at: CUNY Queens College, 65-30 Kissena Blvd, Queens, NY 11367, USA.
[1] Supported by the NSF grants CCF-0952591 and DMS-1413859.
[2] Supported by the Austrian Science Fund (FWF): P27229.

Markus Rosenkranz
University of Kent, SMSAS, Canterbury, United Kingdom
E-mail address: M.Rosenkranz@kent.ac.uk

21 September 2015
Available online 28 September 2015