

COMPUTATIONAL METHODS IN APPLIED MATHEMATICS

HONORARY EDITOR

Vidar Thomée, Göteborg, Sweden

EDITOR-IN-CHIEF

Carsten Carstensen, Berlin, Germany and Seoul, Korea

MANAGING EDITOR

Piotr P. Matus, Minsk, Belarus and Lublin, Poland

EXECUTIVE SECRETARY

Almas Sherbaf, Minsk, Belarus

EDITORS

Ivan Gavriluk, Eisenach, Germany

Ulrich Langer, Linz, Austria

Petr N. Vabishchevich, Moscow, Russia

ASSOCIATE EDITORS

Michele Benzi, Atlanta, USA

Daniele Boffi, Pavia, Italy

Maksymilian Dryja, Warsaw, Poland

Etienne Emmrich, Berlin, Germany

Alexandre Ern, Marne-la-Vallée, France

Maxim A. Olshanskii, Houston, USA

Amiya Kumar Pani, Mumbai, India

Eun-Jae Park, Seoul, Korea

Sergei V. Pereverzev, Linz, Austria

Andreas Prohl, Tübingen, Germany

Sergey I. Repin, St. Petersburg, Russia

Robert Stevenson, Amsterdam, The Netherlands

Martin Stynes, Beijing, China

Lutz Tobiska, Magdeburg, Germany

DE GRUYTER

The highly selective international mathematical journal Computational Methods in Applied Mathematics (CMAM) considers original mathematical contributions to computational methods and numerical analysis with applications mainly related to PDEs. CMAM seeks to be interdisciplinary while retaining the common thread of numerical analysis, it is intended to be readily readable and meant for a wide circle of researchers in applied mathematics.

ISSN 1609-4840 · e-ISSN 1609-9389

All information regarding notes for contributors, subscriptions, Open access, back volumes and orders is available online at www.degruyter.com/cmam.

RESPONSIBLE EDITOR Piotr Matus, Institute of Mathematics NAS of Belarus, 11 Surganov Str. 220072 Minsk Belarus.
Department of Mathematics The John Paul II Catholic University of Lublin, Al. Raclawickie 14, 20-950 Lublin Poland.
Email: matus@im.bas-net.by

JOURNAL MANAGER Theresa Haney, De Gruyter, Genthiner Straße 13, 10785 Berlin, Germany.
Tel.: +49 (0)30 260 05-375, Fax: +49 (0)30 260 05-250
Email: theresa.haney@degruyter.com

RESPONSIBLE FOR ADVERTISEMENTS Claudia Neumann, De Gruyter, Genthiner Straße 13, 10785 Berlin, Germany.
Tel.: +49 (0)30 260 05-226, Fax: +49 (0)30 260 05-264
Email: anzeigen@degruyter.com

© 2016 Walter de Gruyter GmbH, Berlin/Boston

Published by De Gruyter on behalf of the Institute of Mathematics of the National Academy of Science of Belarus.

TYPESETTING Dimler & Albroscheit, Müncheberg

PRINTING Franz X. Stücker Druck und Verlag e.K., Ettenheim

Printed in Germany

COVER ILLUSTRATION © Pasieka/SPL/Agentur Focus



Contents

Research Articles on the Occasion of the Sino-German Workshop on Computational and Applied Mathematics 2015

Carsten Gräser, Max Kahnt, Ralf Kornhuber
Numerical Approximation of Multi-Phase Penrose–Fife Systems — 523

Zhongyi Huang, Yi Yang
Tailored Finite Point Method for Parabolic Problems — 543

Guido Kanschat, José Pablo Lucero Lorca
A Weakly Penalized Discontinuous Galerkin Method for Radiation in Dense, Scattering Media — 563

Daniel Peterseim, Robert Scheichl
Robust Numerical Upscaling of Elliptic Multiscale Problems at High Contrast — 579

Ronald H. W. Hoppe, Jun Hu, Malte A. Peter, Rolf Rannacher, Zhongci Shi, Xuejun Xu
Chinese–German Computational and Applied Mathematics — 605

Regular Research Articles

Immanuel Anjam, Dirk Pauly
Functional A Posteriori Error Control for Conforming Mixed Approximations of Coercive Problems with Lower Order Terms — 609

Ihor Demkiv, Ivan P. Gavrilyuk, Volodymyr L. Makarov
Super-Exponentially Convergent Parallel Algorithm for Eigenvalue Problems with Fractional Derivatives — 633

Asha K. Dond, Thirupathi Gudi, Neela Nataraj
A Nonconforming Finite Element Approximation for Optimal Control of an Obstacle Problem — 653

Andrew Gillette, Alexander Rand, Chandrajit Bajaj
Construction of Scalar and Vector Finite Element Families on Polygonal and Polyhedral Meshes — 667

Markus Klein, Andreas Prohl
Optimal Control for the Thin Film Equation: Convergence of a Multi-Parameter Approach to Track State Constraints Avoiding Degeneracies — 685

