

JOURNAL OF NUMERICAL MATHEMATICS

EDITOR-IN-CHIEF

Maxim Olshanskii, Houston, TX

MANAGING EDITOR

Andrea Bonito, College Station, TX

EDITORIAL ADVISORY BOARD

Markus Bachmayr, Mainz

Michele Benzi, Pisa

Susanne Brenner, Baton Rouge, LA

Erik Burman, London

Carsten Carstensen, Berlin

Miloslav Feistauer, Prague

Simon Foucart, College Station, TX

Jean-Luc Guermond, College Station, TX

Johnny Guzman, Providence, RI

Daniel Kressner, Lausanne

Christoph Lehrenfeld, Gottingen

Frédéric Nataf, Paris

Michael Neilan, Pittsburgh, PA

Fabio Nobile, Lausanne

Alfio Quarteroni, Milan

Leo Rebholz, Clemson, SC

Sergey Repin, St. Petersburg

Arnold Reusken, Aachen

Valeria Simoncini, Bologna

Martin Stoll, Chemnitz

Eugene Tyrtshnikov, Moscow

Stefan Volkwein, Konstanz

Shawn Walker, Baton Rouge, LA

Jun Zou, Hong Kong

HONORARY FOUNDING EDITOR

Yuri A. Kuznetsov, Houston, TX

HONORARY MEMBER

Ronald Hoppe, Augsburg

DE GRUYTER

JOURNAL OF NUMERICAL MATHEMATICS is a journal devoted to the publication of high quality papers featuring contemporary research in all areas of Numerical Mathematics. This includes the development, analysis and implementation of new and innovative methods in Numerical Linear Algebra, Numerical Analysis, Optimal Control/Optimization, and Scientific Computing. The journal will also publish applications-oriented papers related to problems in engineering, finance, and life sciences.

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

ABSTRACTED/INDEXED IN Baidu Scholar · Cabells Journalytics · CNKI Scholar (China National Knowledge Infrastructure) · CNPIEC: cnpLINKer · DBLP Computer Science Bibliography · Dimensions · EBSCO (relevant databases) · EBSCO Discovery Service · Engineering Village · Genamics JournalSeek · Google Scholar · Japan Science and Technology Agency (JST) · J-Gate · Journal Citation Reports/Science Edition · JournalGuide · JournalTOCs · KESLI-NDSL (Korean National Discovery for Science Leaders) · Mathematical Reviews (MathSciNet) · Microsoft Academic · MyScienceWork · Naver Academic · Naviga (Softweco) · Primo Central (ExLibris) · ProQuest (relevant databases) · Publons · QOAM (Quality Open Access Market) · ReadCube · SCImago (SJR) · SCOPUS · Semantic Scholar · Sherpa/RoMEO · Summon (ProQuest) · TDNet · Ulrich's Periodicals Directory/ulrichsweb · WanFang Data · Web of Science: Current Contents/Physical, Chemical and Earth Sciences; Science Citation Index Expanded · WorldCat (OCLC) · Yewno Discover · zbMATH Open

ISSN 1570-2820 · e-ISSN 1569-3953 · CODEN JNMOAM

RESPONSIBLE EDITOR Maxim Olshanskii, Department of Mathematics, University of Houston, Houston, TX 77204-3008, USA.
E-mail: molshan@math.uh.edu

MANAGING EDITOR Andrea Bonito, Department of Mathematics, Texas A&M University, College Station, TX 77843-3368, USA.
E-mail: bonito@math.tamu.edu

PUBLISHER Walter de Gruyter GmbH, Berlin/Boston, Genthiner Straße 13, 10785 Berlin, Germany

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

RESPONSIBLE FOR ADVERTISEMENTS Markus Kügel, De Gruyter, Rosenheimer Str. 143, 81671 München, Germany.
Tel.: +49 89 76 902 424. E-mail: anzeigen@degruyter.com

© 2022 Walter de Gruyter GmbH, Berlin/Boston

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



Offenlegung der Inhaber und Beteiligungsverhältnisse gem. § 7a Abs. 1 Ziff. 1, Abs. 2 Ziff. 3 des Berliner Pressegesetzes: Die Gesellschafter der Walter de Gruyter GmbH sind: Cram, Gisela, Rentnerin, Berlin; Cram, Elsbeth, Pensionärin, Rosengarten-Alvesen; Cram, Dr. Georg-Martin, Unternehmens-Systemberater, Stadtbergen; Cram, Maike, Wien (Österreich); Cram, Jens, Mannheim; Cram, Ingrid, Betriebsleiterin, Tuxpan/Michoacan (Mexiko); Cram, Sabina, Mexico, DF (Mexiko); Cram, Silke, Wissenschaftlerin, Mexico DF (Mexiko); Cram, Björn, Aachen; Cram, Berit, Hamm; Cram-Gomez, Susana, Mexico DF (Mexiko); Cram-Heydrich, Walter, Mexico DF (Mexico); Cram-Heydrich, Kurt, Angestellter, Mexico DF (Mexico); Duvenbeck, Brigitta, Oberstudienrätin i.R., Bad Homburg; Gädeke, Gudula, M.A., Atemtherapeutin/Lehrerin, Tübingen; Gädeke, Martin, Student, Ingolstadt; Gomez Cram, Arturo Walter, Global Key Account Manager, Bonn; Gomez Cram, Ingrid Arlene, Studentin, Mexico, DF (Mexiko); Gomez Cram, Robert, Assistant Professor, London UK, Lubasch, Dr. Annette, Ärztin, Berlin; Schütz, Dr. Christa, Ärztin, Mannheim; Schütz, Sonja, Diplom.-Betriebswirtin (FH), Berlin; Schütz, Juliane, Berlin; Schütz, Antje, Berlin; Schütz, Valentin, Mannheim; Seils, Dorothee, Apothekerin, Stuttgart; Seils, Gabriele, Journalistin, Berlin; Seils, Christoph, Journalist, Berlin; Siebert, Carmen, Angestellte, Kempten; Siebert, John-Walter, Pfarrer, Oberstenfeld; Anh Vinh Alwin Tran, Student, Zürich (Schweiz), Tran, Renate, Mediatorin, Zürich (Schweiz); Duyen Anh Johann Tran, Architekt, Zürich (Schweiz); Lang Lieu Laurin Tran, Lehrperson, Zürich (Schweiz); Duyen Mai Marie Tran, Studentin, Zürich (Schweiz); Anh Huy Merlin Tran, Schüler, Zürich (Schweiz).

Contents

Sean Ingimarson

An energy, momentum, and angular momentum conserving scheme for a regularization model of incompressible flow — 1

Fei Huang, Zuliang Lu, Lin Li, Xiankui Wu, Shang Liu, and Yin Yang

Numerical simulation for European and American option of risks in climate change of Three Gorges Reservoir Area — 23

Antonio Márquez and Salim Meddahi

Mixed-hybrid and mixed-discontinuous Galerkin methods for linear dynamical elastic–viscoelastic composite structures — 43

Maria Strazzullo, Francesco Ballarin, and Gianluigi Rozza

POD-Galerkin model order reduction for parametrized nonlinear time-dependent optimal flow control: an application to shallow water equations — 63

