
VOLUME 91

NUMBER 338

NOVEMBER 2022

MATHEMATICS OF COMPUTATION

ISSN 0025-5718 (print)
ISSN 1088-6842 (online)

A M E R I C A N M A T H E M A T I C A L S O C I E T Y

EDITED BY

Paola F. Antonietti
Markus Bachmayr
Jennifer Balakrishnan
Ernesto G. Birgin
Susanne C. Brenner, *Managing Editor*
Martin Burger
Coralia Cartis
Ronald F. A. Cools
Alan Demlow
Bruno Despres
Alicia Dickenstein
Jan Draisma
Qiang Du
Bettina Eick
Howard C. Elman
Kevin Hare
Ralf Hiptmair
Frances Kuo
Buyang Li
Christian Lubich
Andrei Martínez-Finkelshtein
Jens Markus Melenk
Michael J. Mossinghoff
Michael J. Neilan
Fabio Nobile
Adam M. Oberman
Daniel Peterseim
Robert Scheichl
Igor E. Shparlinski
Chi-Wang Shu
Andrew V. Sutherland
Daniel B. Szyld



AMERICAN
MATHEMATICAL
SOCIETY

Providence, Rhode Island USA

Mathematics of Computation

This journal is devoted to research articles of the highest quality in computational mathematics. Areas covered include numerical analysis, computational discrete mathematics, including number theory, algebra and combinatorics, and related fields such as stochastic numerical methods. Articles must be of significant computational interest and contain original and substantial mathematical analysis or development of computational methodology.

Submission information. See **Information for Authors** at the end of this issue.

Publication on the AMS website. Articles are published on the AMS website individually after proof is returned from authors and before appearing in an issue.

Subscription information. *Mathematics of Computation* is published bimonthly and is also accessible electronically from www.ams.org/journals/. Subscription prices for Volume 91 (2022) are as follows: for paper delivery, US\$846.00 list, US\$676.80 institutional member, US\$761.40 corporate member, US\$507.60 individual member; for electronic delivery, US\$744.00 list, US\$595.20 institutional member, US\$669.60 corporate member, US\$446.40 individual member. Upon request, subscribers to paper delivery of this journal are also entitled to receive electronic delivery. If ordering the paper version, add US\$6 for delivery within the United States; US\$31 for delivery outside the United States. Subscription renewals are subject to late fees. See www.ams.org/help-faq for more journal subscription information.

Back number information. For back issues see the www.ams.org/backvols.

Subscriptions and orders should be addressed to the American Mathematical Society, P.O. Box 845904, Boston, MA 02284-5904 USA. *All orders must be accompanied by payment.* Other correspondence should be addressed to 201 Charles Street, Providence, RI 02904-2213 USA.

Copying and reprinting. Individual readers of this publication, and nonprofit libraries acting for them, are permitted to make fair use of the material, such as to copy an article for use in teaching or research. Permission is granted to quote brief passages from this publication in reviews, provided the customary acknowledgment of the source is given.

Republication, systematic copying, or multiple reproduction of any material in this publication is permitted only under license from the American Mathematical Society. Requests for permission to reuse portions of AMS publication content are handled by the Copyright Clearance Center. For more information, please visit www.ams.org/publications/pubpermissions.

Excluded from these provisions is material for which the author holds copyright. In such cases, requests for permission to reuse or reprint material should be addressed directly to the author(s). Copyright ownership is indicated in the notice in the lower right-hand corner of the first page of each article.

Mathematics of Computation (ISSN 0025-5718 (print); ISSN 1088-6842 (online)) is published bimonthly by the American Mathematical Society at 201 Charles Street, Providence, RI 02904-2213 USA. Periodicals postage is paid at Providence, Rhode Island. Postmaster: Send address changes to Mathematics of Computation, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2213 USA.

© 2022 by the American Mathematical Society. All rights reserved.

This journal is indexed in *Mathematical Reviews*, *Zentralblatt MATH*, *Science Citation Index*®, *Science Citation Index*TM-*Expanded*, *ISI Alerting Services*SM, *CompuMath Citation Index*®, and *Current Contents*®/*Physical, Chemical & Earth Sciences*. This journal is archived in *Portico* and in *CLOCKSS*.

⊗ The paper used in this book is acid-free and falls within the guidelines established to ensure permanence and durability.

10 9 8 7 6 5 4 3 2 1 27 26 25 24 23 22

MATHEMATICS OF COMPUTATION

CONTENTS

Vol. 91, No. 338

November 2022

Dong Li, Why large time-stepping methods for the Cahn-Hilliard equation is stable	2501
Bo Gong, Jiguang Sun, Tiara Turner, and Chunxiong Zheng, Finite element/holomorphic operator function method for the transmission eigenvalue problem	2517
Chupeng Ma and Robert Scheichl, Error estimates for discrete generalized FEMs with locally optimal spectral approximations	2539
Johnny Guzmán, Anna Lischke, and Michael Neilan, Exact sequences on Worsley–Farin splits	2571
Wansheng Wang and Lijun Yi, Delay-dependent elliptic reconstruction and optimal $L^\infty(L^2)$ a posteriori error estimates for fully discrete delay parabolic problems	2609
Bruno Després, Maria El Ghaoui, and Toni Sayah, A Trefftz method with reconstruction of the normal derivative applied to elliptic equations	2645
Assyr Abdulle, Marcus J. Grote, and Giacomo Rosilho de Souza, Explicit stabilized multirate method for stiff differential equations	2681
David Krieg, Erich Novak, and Mathias Sonleitner, Recovery of Sobolev functions restricted to iid sampling	2715
Elisenda Feliu and AmirHosein Sadeghimanesh, Kac-Rice formulas and the number of solutions of parametrized systems of polynomial equations	2739
Josef Dick, Takashi Goda, and Kosuke Suzuki, Component-by-component construction of randomized rank-1 lattice rules achieving almost the optimal randomized error rate	2771
Sotirios E. Notaris, Anti-Gaussian quadrature formulae of Chebyshev type	2803
Ariel Pacetti and Lucas Villagra Torcomian, \mathbb{Q} -Curves, Hecke characters and some Diophantine equations	2817
Thomas Rüd, Explicit Tamagawa numbers for certain algebraic tori over number fields	2867
Colin Faverjon and Marina Poulet, An algorithm to recognize regular singular Mahler systems	2905
James Rickards, Improved computation of fundamental domains for arithmetic Fuchsian groups	2929
Guillem Blanco, An algorithm for Hodge ideals	2955
Sandra Di Rocco, David Eklund, and Oliver Gäfvert, Sampling and homology via bottlenecks	2969

INDEX TO VOLUME 91 (2022)

- Abdulle, Assyr, Marcus J. Grote, and Giacomo Rosilho de Souza. *Explicit stabilized multirate method for stiff differential equations*, 2681
- Abreu, Alex, Sally Andria, and Marco Pacini. *Abel maps for nodal curves via tropical geometry*, 1971
- Akgün, Ö., M. Mereb, and L. Vendramin. *Enumeration of set-theoretic solutions to the Yang–Baxter equation*, 1469
- Amzallag, Eli, Andrei Minchenko, and Gleb Pogudin. *Degree bound for toric envelope of a linear algebraic group*, 1501
- Andria, Sally. *See* Abreu, Alex
- Angelini, Elena, and Luca Chiantini. *Minimality and uniqueness for decompositions of specific ternary forms*, 973
- Asif, Sualeh, Francesc Fité, and Dylan Pentland, contributor A. V. Sutherland. *Computing L -polynomials of Picard curves from Cartier–Manin matrices*, 943
- Audet, Charles. *See* Bingane, Christian
- Banjai, Lehel, and Charalambos G. Makridakis. *A posteriori error analysis for approximations of time-fractional subdiffusion problems*, 1711
- Bao, Weizhu, Yue Feng, and Chunmei Su. *Uniform error bounds of time-splitting spectral methods for the long-time dynamics of the nonlinear Klein–Gordon equation with weak nonlinearity*, 811
- Barakat, Mohamed, and Markus Lange-Hegermann. *An algorithmic approach to Chevalley’s Theorem on images of rational morphisms between affine varieties*, 451
- Barbulescu, Razvan, and Sudarshan Shinde. *A classification of ECM-friendly families of elliptic curves using modular curves*, 1405
- Bazan, Erick Rodriguez. *See* Hubert, Evelyne
- Beltrán, Carlos, Laurent Bétermin, Peter Grabner, and Stefan Steinerberger. *How well-conditioned can the eigenvector problem be?*, 1237
- Bender, Matías R., and Simon Telen. *Toric eigenvalue methods for solving sparse polynomial systems*, 2397
- Benoît, Antoine. *Stability of finite difference schemes approximation for hyperbolic boundary value problems in an interval*, 1171
- Bétermin, Laurent. *See* Beltrán, Carlos
- Bingane, Christian, and Charles Audet. *The equilateral small octagon of maximal width*, 2027
- Blanco, Guillem. *An algorithm for Hodge ideals*, 2955
- Blanes, S., F. Casas, P. Chartier, and A. Escorihuela-Tomàs. *On symmetric-conjugate composition methods in the numerical integration of differential equations*, 1739
- Bringmann, Kathrin, and Ben Kane. *Class numbers and representations by ternary quadratic forms with congruence conditions*, 295
- Brinkmann, Gunnar, Jan Goedgebeur, and Brendan D. McKay. *The minimality of the Georges–Kelmans graph*, 1483
- Calvo, María Cabrera, Frédéric Rousset, and Katharina Schratz. *Time integrators for dispersive equations in the long wave regime*, 2197
- Cangiani, Andrea, Zhaonan Dong, and Emmanuil H. Georgoulis. *hp-version discontinuous Galerkin methods on essentially arbitrarily-shaped elements*, 1
- Carrillo, José A. *See* Gutleb, Timon S.
- Carstensen, Carsten, and Stefan A. Sauter. *Crouzeix–Raviart triangular elements are inf-sup stable*, 2041
- Casas, F. *See* Blanes, S.
- Chada, Neil K., and Xin T. Tong. *Convergence acceleration of ensemble Kalman inversion in nonlinear settings*, 1247
- Chartier, P. *See* Blanes, S.
- Chartier, Philippe, Mohammed Lemou, and Léopold Trémant. *A uniformly accurate numerical method for a class of dissipative systems*, 843
- Chaumont-Frelet, T., A. Ern, and M. Vohralík. *Stable broken $\mathbf{H}(\mathbf{curl})$ polynomial extensions and p -robust a posteriori error estimates by broken patchwise equilibration for the curl–curl problem*, 37
- Chen, Long, and Xuehai Huang. *Finite elements for divdiv conforming symmetric tensors in three dimensions*, 1107
- . *A finite element elasticity complex in three dimensions*, 2095

- Chen, Swaine L., and Nico M. Temme. *A distribution function from population genetics statistics using Stirling numbers of the first kind: Asymptotics, inversion and numerical evaluation*, 871
- Chen, Xiaojun. *See* Li, Chao
- Chiantini, Luca. *See* Angelini, Elena
- Cohn, Henry, and Nicholas Triantafillou. *Dual linear programming bounds for sphere packing via modular forms*, 491
- Cui, Jianbo, Luca Dieci, and Haomin Zhou. *Time discretizations of Wasserstein–Hamiltonian flows*, 1019
- Cui, Jianbo, Jialin Hong, and Derui Sheng. *Density function of numerical solution of splitting AVF scheme for stochastic Langevin equation*, 2283
- Cui, Tiangang. *See* Zahm, Olivier
- Cully-Hugill, Michaela, and Ethan S. Lee. *Explicit interval estimates for prime numbers*, 1955
- Dahmen, Wolfgang, Rob Stevenson, and Jan Westerdiep. *Accuracy controlled data assimilation for parabolic problems*, 557
- Dembélé, Lassina. *On the existence of abelian surfaces with everywhere good reduction*, 1381
- Després, Bruno, Maria El Ghaoui, and Toni Sayah. *A Trefftz method with reconstruction of the normal derivative applied to elliptic equations*, 2645
- Di Rocco, Sandra, David Eklund, and Oliver Gäfvert. *Sampling and homology via bottlenecks*, 2969
- Dick, Josef, Takashi Goda, and Kosuke Suzuki. *Component-by-component construction of randomized rank-1 lattice rules achieving almost the optimal randomized error rate*, 2771
- Dieci, Luca. *See* Cui, Jianbo
- Doerr, Benjamin. *A sharp discrepancy bound for jittered sampling*, 1871
- Dong, Zhaonan. *See* Cangiani, Andrea
- Dörich, Benjamin, and Jan Leibold. *Full discretization error analysis of exponential integrators for semilinear wave equations*, 1687
- Drake, Dow, Jay Gopalakrishnan, Joachim Schöberl, and Christoph Wintersteiger. *Convergence analysis of some tent-based schemes for linear hyperbolic systems*, 699
- Eklund, David. *See* Di Rocco, Sandra
- El Ghaoui, Maria. *See* Després, Bruno
- Ern, A. *See* Chaumont-Frelet, T.
- Ernvall-Hytönen, Anne-Maria, and Neea Palojärvi. *Explicit bound for the number of primes in arithmetic progressions assuming the Generalized Riemann Hypothesis*, 1317
- Escorihuela-Tomàs, A. *See* Blanes, S.
- Farrell, Patrick, Pablo Alexei Gazca Orozco, and Endre Süli. *Finite element approximation and preconditioning for anisothermal flow of implicitly-constituted non-Newtonian fluids*, 659
- Faverjon, Colin, and Marina Poulet. *An algorithm to recognize regular singular Mahler systems*, 2905
- Feireisl, Eduard, Mária Lukáčová-Medvid'ová, Simon Schneider, and Bangwei She. *Approximating viscosity solutions of the Euler system*, 2129
- Feischl, Michael. *Inf-sup stability implies quasi-orthogonality*, 2059
- Feliu, Elisenda, and AmirHosein Sadeghimanesh. *Kac-Rice formulas and the number of solutions of parametrized systems of polynomial equations*, 2739
- Feng, Yue. *See* Bao, Weizhu
- Fité, Francesc. *See* Asif, Sualeh
- Frei, Christopher, and Rodolphe Richard. *Constructing abelian extensions with prescribed norms*, 381
- Führer, Thomas. *Multilevel decompositions and norms for negative order Sobolev spaces*, 183
- Gäfvert, Oliver. *See* Di Rocco, Sandra
- Garde, Henrik, and Nuutti Hyvönen. *Series reversion in Calderón's problem*, 1925
- Georgoulis, Emmanuil H. *See* Cangiani, Andrea
- Gilbert, Alexander D., Frances Y. Kuo, and Ian H. Sloan. *Equivalence between Sobolev spaces of first-order dominating mixed smoothness and unanchored ANOVA spaces on \mathbb{R}^d* , 1837
- Gjerde, Ingeborg G., and L. Ridgway Scott. *Nitsche's method for Navier–Stokes equations with slip boundary conditions*, 597
- Goda, Takashi. *See* Dick, Josef
- Goedgebeur, Jan. *See* Brinkmann, Gunnar

- Gong, Bo, Jiguang Sun, Tiara Turner, and Chunxiong Zheng. *Finite element/holomorphic operator function method for the transmission eigenvalue problem*, 2517
- Gopalakrishnan, Jay. *See* Drake, Dow
- Grabner, Peter. *See* Beltrán, Carlos
- Grote, Marcus J. *See* Abdulle, Assyr
- Gutleb, Timon S., José A. Carrillo, and Sheehan Olver. *Computing equilibrium measures with power law kernels*, 2247
- Guzmán, Johnny, Anna Lischke, and Michael Neilan. *Exact sequences on Worsley–Farin splits*, 2571
- Haberstich, Cécile, Anthony Nouy, and Guillaume Perrin. *Boosted optimal weighted least-squares*, 1281
- Harvey, David, and Markus Hittmeir. *A log-log speedup for exponent one-fifth deterministic integer factorisation*, 1367
- Hasanalizade, Elchin, Quanli Shen, and Peng-Jie Wong. *Counting zeros of Dedekind zeta functions*, 277
- Henning, Patrick, and Johan Wärnegård. *Superconvergence of time invariants for the Gross–Pitaevskii equation*, 509
- Hittmeir, Markus. *See* Harvey, David
- Hong, Jialin. *See* Cui, Jianbo
- Hong, Qingguo, Yuwen Li, and Jinchao Xu. *An extended Galerkin analysis infinite element exterior calculus*, 1077
- Hornik, Kurt. *See* Sablica, Lukas
- Hoshi, Akinari, Kazuki Kanai, and Aiichi Yamasaki. *Norm one Tori and Hasse norm principle*, 2431
- Hu, Jun, and Limin Ma. *Asymptotic expansions of eigenvalues by both the Crouzeix–Raviart and enriched Crouzeix–Raviart elements*, 75
- Huang, Xuehai. *See* Chen, Long
- Hubert, Evelyne, and Erick Rodriguez Bazan. *Algorithms for fundamental invariants and equivariants of finite groups*, 2459
- Hulpe, Alexander. *The perfect groups of order up to two million*, 1007
- Hyvönen, Nuutti. *See* Garde, Henrik
- Jarso, Tamiru, and Tim Trudgian. *Four consecutive primitive elements in a finite field*, 1521
- Jorgenson, Jay, Lejla Smajlović, and Holger Then. *An approach for computing generators of class fields of imaginary quadratic number fields using the Schwarzian derivative*, 331
- Kaltenbacher, Barbara, and William Rundell. *On an inverse problem of nonlinear imaging with fractional damping*, 245
- Kanai, Kazuki. *See* Hoshi, Akinari
- Kane, Ben. *See* Bringmann, Kathrin
- Kaya, Enis. *Explicit Vologodsky integration for hyperelliptic curves*, 2367
- Khan, Arbaz, and Pietro Zanotti. *A nonsymmetric approach and a quasi-optimal and robust discretization for the Biot’s model*, 1143
- Kirschmer, Markus, Fabien Narbonne, Christophe Ritzenthaler, and Damien Robert. *Spanning the isogeny class of a power of an elliptic curve*, 401
- Krieg, David, Erich Novak, and Mathias Sonleitner. *Recovery of Sobolev functions restricted to \tilde{u}_d sampling*, 2715
- Kuo, Frances Y. *See* Gilbert, Alexander D.
- Lange-Hegermann, Markus. *See* Barakat, Mohamed
- Lauder, Alan, and Jan Vonk. *Computing p -adic L -functions of totally real fields*, 921
- Law, Kody. *See* Zahm, Olivier
- Lee, Ethan S. *See* Cully-Hugill, Michaela
- Leibold, Jan. *See* Dörich, Benjamin
- Lemou, Mohammed. *See* Chartier, Philippe
- Li, Buyang. *Maximum-norm stability of the finite element method for the Neumann problem in nonconvex polygons with locally refined mesh*, 1533
- Li, Chao, and Xiaojun Chen. *Isotropic non-Lipschitz regularization for sparse representations of random fields on the sphere*, 219
- Li, Dong. *Why large time-stepping methods for the Cahn–Hilliard equation is stable*, 2501

- Li, Dong, Chaoyu Quan, and Tao Tang. *Stability and convergence analysis for the implicit-explicit method to the Cahn-Hilliard equation*, 785
- Li, Wenbo, and Ricardo H. Nochetto. *Two-scale methods for convex envelopes*, 111
- Li, Xiaoli, Jie Shen, and Zhengguang Liu. *New SAV-pressure correction methods for the Navier-Stokes equations: stability and error analysis*, 141
- Li, Yuwen. *See* Hong, Qingguo
- Liang, Qigang, and Xuejun Xu. *A two-level preconditioned Helmholtz-Jacobi-Davidson method for the Maxwell eigenvalue problem*, 623
- Lischke, Anna. *See* Guzmán, Johnny
- Liu, Chen. *See* Masri, Rami
- Liu, Zhengguang. *See* Li, Xiaoli
- Lu, Shuai, and Peter Mathé. *Stochastic gradient descent for linear inverse problems in Hilbert spaces*, 1763
- Lukáčová-Medvid'ová, Mária. *See* Feireisl, Eduard
- Ma, Chupeng, and Robert Scheichl. *Error estimates for discrete generalized FEMs with locally optimal spectral approximations*, 2539
- Ma, Limin. *See* Hu, Jun
- Maier, Roland, and Barbara Verfürth. *Multiscale scattering in nonlinear Kerr-type media*, 1655
- Makridakis, Charalambos G. *See* Banjai, Lehel
- Marques, Diego, and Pavel Trojovský. *Error estimates for a class of continuous Bonse-type inequalities*, 2335
- Marzouk, Youssef. *See* Zahm, Olivier
- Masri, Rami, Chen Liu, and Beatrice Riviere. *A discontinuous Galerkin pressure correction scheme for the incompressible Navier–Stokes equations: Stability and convergence*, 1625
- Mathé, Peter. *See* Lu, Shuai
- McKay, Brendan D. *See* Brinkmann, Gunnar
- Melenk, Jens Markus. *See* Rieder, Alexander
- Mereb, M. *See* Akgün, Ö.
- Minchenko, Andrei. *See* Amzallag, Eli
- Narbonne, Fabien. *See* Kirschmer, Markus
- Neilan, Michael. *See* Guzmán, Johnny
- Nochetto, Ricardo H. *See* Li, Wenbo
- Notaris, Sotirios E. *Anti-Gaussian quadrature formulae of Chebyshev type*, 2803
- Nouy, Anthony. *See* Haberstich, Cécile
- Novak, Erich. *See* Krieg, David
- Olver, Sheehan. *See* Gutleb, Timon S.
- Orozco, Pablo Alexei Gazca. *See* Farrell, Patrick
- Ostermann, Alexander, Frédéric Rousset, and Katharina Schratz. *Error estimates at low regularity of splitting schemes for NLS*, 169
- Pacetti, Ariel, and Lucas Villagra Torcomian. *\mathbb{Q} -Curves, Hecke characters and some Diophantine equations*, 2817
- Pacini, Marco. *See* Abreu, Alex
- Pagani, Lorenzo. *Greenberg's conjecture for real quadratic fields and the cyclotomic \mathbb{Z}_2 -extensions*, 1437
- Palojärvi, Neea. *See* Ernvall-Hytönen, Anne-Maria
- Pentland, Dylan. *See* Asif, Sualeh
- Perrin, Guillaume. *See* Haberstich, Cécile
- Pogudin, Gleb. *See* Amzallag, Eli
- Poulet, Marina. *See* Faverjon, Colin
- Quan, Chaoyu. *See* Li, Dong
- Quesada-Herrera, Oscar E. *On the q -analogue of the Pair Correlation Conjecture via Fourier optimization*, 2347
- Reusken, Arnold. *Analysis of finite element methods for surface vector-Laplace eigenproblems*, 1587
- Richard, Rodolphe. *See* Frei, Christopher
- Rickards, James. *Improved computation of fundamental domains for arithmetic Fuchsian groups*, 2929

- Rieder, Alexander, Francisco–Javier Sayas, and Jens Markus Melenk. *Time domain boundary integral equations and convolution quadrature for scattering by composite media*, 2165
- Ritzenthaler, Christophe. *See* Kirschmer, Markus
- Riviere, Beatrice. *See* Masri, Rami
- Robert, Damien. *See* Kirschmer, Markus
- Rosenfeld, Matthieu. *Avoiding squares over words with lists of size three amongst four symbols*, 2489
- Rousset, Frédéric. *See* Calvo, María Cabrera
- . *See* Ostermann, Alexander
- Rüd, Thomas. *Explicit Tamagawa numbers for certain algebraic tori over number fields*, 2867
- Rundell, William. *See* Kaltenbacher, Barbara
- Sablica, Lukas, and Kurt Hornik. *On bounds for Kummer’s function ratio*, 887
- Sadeghimanesh, AmirHosein. *See* Feliu, Elisenda
- Sauter, Yannick. *New results for witnesses of Robin’s criterion*, 909
- Sauter, Stefan A. *See* Carstensen, Carsten
- Sayah, Toni. *See* Després, Bruno
- Sayas, Francisco–Javier. *See* Rieder, Alexander
- Scheichl, Robert. *See* Ma, Chupeng
- Schneider, Simon. *See* Feireisl, Eduard
- Schöberl, Joachim. *See* Drake, Dow
- Schratz, Katharina. *See* Calvo, María Cabrera
- . *See* Ostermann, Alexander
- Scott, L. Ridgway. *See* Gjerde, Ingeborg G.
- She, Bangwei. *See* Feireisl, Eduard
- Shen, Jie. *See* Li, Xiaoli
- Shen, Quanli. *See* Hasanalizade, Elchin
- Sheng, Derui. *See* Cui, Jianbo
- Shinde, Sudarshan. *See* Barbulescu, Razvan
- Sloan, Ian H. *See* Gilbert, Alexander D.
- Smajlović, Lejla. *See* Jorgenson, Jay
- Sonnleitner, Mathias. *See* Krieg, David
- de Souza, Giacomo Rosilho. *See* Abdulle, Assyr
- Spantini, Alessio. *See* Zahm, Olivier
- Steinerberger, Stefan. *See* Beltrán, Carlos
- Stevenson, Rob. *See* Dahmen, Wolfgang
- Su, Chunmei. *See* Bao, Weizhu
- Süli, Endre. *See* Farrell, Patrick
- Sun, Jiguang. *See* Gong, Bo
- Sutherland, A. V. *See* Asif, Sualeh
- Suzuki, Kosuke. *See* Dick, Josef
- Tang, Tao. *See* Li, Dong
- Telen, Simon. *See* Bender, Matías R.
- Temme, Nico M. *See* Chen, Swaine L.
- Then, Holger. *See* Jorgenson, Jay
- Tong, Xin T. *See* Chada, Neil K.
- Torcomian, Lucas Villagra. *See* Pacetti, Ariel
- Trémant, Léopold. *See* Chartier, Philippe
- Triantafyllou, Nicholas. *See* Cohn, Henry
- Trojovský, Pavel. *See* Marques, Diego
- Trudgian, Tim. *See* Jarso, Tamiru
- Turner, Tiara. *See* Gong, Bo
- Vendramin, L. *See* Akgün, Ö.
- Verfürth, Barbara. *See* Maier, Roland
- Vohralík, M. *See* Chaumont-Frelet, T.
- Vonk, Jan. *See* Lauder, Alan
- Wang, Jihong, Jiwei Zhang, and Chunxiong Zheng. *Stability and error analysis for a second-order approximation of 1D nonlocal Schrödinger equation under DtN-type boundary conditions*, 761

- Wang, Wansheng, and Lijun Yi. *Delay-dependent elliptic reconstruction and optimal $L^\infty(L^2)$ a posteriori error estimates for fully discrete delay parabolic problems*, 2609
- Wang, Yan, and Xiaofei Zhao. *A symmetric low-regularity integrator for nonlinear Klein-Gordon equation*, 2215
- Wang, Yinkun, and Shuhuang Xiang. *Fast and stable augmented Levin methods for highly oscillatory and singular integrals*, 1893
- Wärnegård, Johan. *See* Henning, Patrick
- Westerdiep, Jan. *See* Dahmen, Wolfgang
- Wintersteiger, Christoph. *See* Drake, Dow
- Wong, Peng-Jie. *See* Hasanalizade, Elchin
- Wu, Yifei, and Fangyan Yao. *A first-order Fourier integrator for the nonlinear Schrödinger equation on \mathbb{T} without loss of regularity*, 1213
- Xiang, Shuhuang. *See* Wang, Yinkun
- Xu, Jinchao. *See* Hong, Qingguo
- Xu, Xuejun. *See* Liang, Qigang
- Yamasaki, Aiichi. *See* Hoshi, Akinari
- Yao, Fangyan. *See* Wu, Yifei
- Yi, Lijun. *See* Wang, Wansheng
- Zahm, Olivier, Tiangang Cui, Kody Law, Alessio Spantini, and Youssef Marzouk. *Certified dimension reduction in nonlinear Bayesian inverse problems*, 1789
- Zanotti, Pietro. *See* Khan, Arbaz
- Zhang, Jiwei. *See* Wang, Jihong
- Zhao, Weifeng. *Strictly convex entropy and entropy stable schemes for reactive Euler equations*, 735
- Zhao, Xiaofei. *See* Wang, Yan
- Zheng, Chunxiong. *See* Gong, Bo
- . *See* Wang, Jihong
- Zhou, Haomin. *See* Cui, Jianbo

MATHEMATICS OF COMPUTATION

ISSN 0025-5718 (print)
ISSN 1088-6842 (online)

A M E R I C A N M A T H E M A T I C A L S O C I E T Y

EDITED BY

Paola F. Antonietti
Markus Bachmayr
Jennifer Balakrishnan
Ernesto G. Birgin
Susanne C. Brenner, *Managing Editor*
Martin Burger
Coralia Cartis
Ronald F. A. Cools
Alan Demlow
Bruno Despres
Alicia Dickenstein
Jan Draisma
Qiang Du
Bettina Eick
Howard C. Elman
Kevin Hare
Ralf Hiptmair
Frances Kuo
Buyang Li
Christian Lubich
Andrei Martínez-Finkelshtein
Jens Markus Melenk
Michael J. Mossinghoff
Michael J. Neilan
Fabio Nobile
Adam M. Oberman
Daniel Peterseim
Robert Scheichl
Igor E. Shparlinski
Chi-Wang Shu
Andrew V. Sutherland
Daniel B. Szyld



AMERICAN
MATHEMATICAL
SOCIETY

Providence, Rhode Island USA

Mathematics of Computation

This journal is devoted to research articles of the highest quality in computational mathematics. Areas covered include numerical analysis, computational discrete mathematics, including number theory, algebra and combinatorics, and related fields such as stochastic numerical methods. Articles must be of significant computational interest and contain original and substantial mathematical analysis or development of computational methodology.

Submission information. See **Information for Authors** at the end of this issue.

Publication on the AMS website. Articles are published on the AMS website individually after proof is returned from authors and before appearing in an issue.

Subscription information. *Mathematics of Computation* is published bimonthly and is also accessible electronically from www.ams.org/journals/. Subscription prices for Volume 91 (2022) are as follows: for paper delivery, US\$846.00 list, US\$676.80 institutional member, US\$761.40 corporate member, US\$507.60 individual member; for electronic delivery, US\$744.00 list, US\$595.20 institutional member, US\$669.60 corporate member, US\$446.40 individual member. Upon request, subscribers to paper delivery of this journal are also entitled to receive electronic delivery. If ordering the paper version, add US\$6 for delivery within the United States; US\$31 for delivery outside the United States. Subscription renewals are subject to late fees. See www.ams.org/help-faq for more journal subscription information.

Back number information. For back issues see the www.ams.org/backvols.

Subscriptions and orders should be addressed to the American Mathematical Society, P.O. Box 845904, Boston, MA 02284-5904 USA. *All orders must be accompanied by payment.* Other correspondence should be addressed to 201 Charles Street, Providence, RI 02904-2213 USA.

Copying and reprinting. Individual readers of this publication, and nonprofit libraries acting for them, are permitted to make fair use of the material, such as to copy an article for use in teaching or research. Permission is granted to quote brief passages from this publication in reviews, provided the customary acknowledgment of the source is given.

Republication, systematic copying, or multiple reproduction of any material in this publication is permitted only under license from the American Mathematical Society. Requests for permission to reuse portions of AMS publication content are handled by the Copyright Clearance Center. For more information, please visit www.ams.org/publications/pubpermissions.

Excluded from these provisions is material for which the author holds copyright. In such cases, requests for permission to reuse or reprint material should be addressed directly to the author(s). Copyright ownership is indicated in the notice in the lower right-hand corner of the first page of each article.

Mathematics of Computation (ISSN 0025-5718 (print); ISSN 1088-6842 (online)) is published bimonthly by the American Mathematical Society at 201 Charles Street, Providence, RI 02904-2213 USA. Periodicals postage is paid at Providence, Rhode Island. Postmaster: Send address changes to Mathematics of Computation, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2213 USA.

© 2022 by the American Mathematical Society. All rights reserved.

This journal is indexed in *Mathematical Reviews*, *Zentralblatt MATH*, *Science Citation Index*®, *Science Citation Index*TM-*Expanded*, *ISI Alerting Services*SM, *CompuMath Citation Index*®, and *Current Contents*®/*Physical, Chemical & Earth Sciences*. This journal is archived in *Portico* and in *CLOCKSS*.

⊗ The paper used in this book is acid-free and falls within the guidelines established to ensure permanence and durability.

10 9 8 7 6 5 4 3 2 1 27 26 25 24 23 22

MATHEMATICS OF COMPUTATION

CONTENTS

Vol. 91, No. 333

January 2022

Andrea Cangiani, Zhaonan Dong, and Emmanuil H. Georgoulis , <i>hp-version discontinuous Galerkin methods on essentially arbitrarily-shaped elements</i>	1
T. Chaumont-Frelet, A. Ern, and M. Vohralík , <i>Stable broken $H(\mathbf{curl})$ polynomial extensions and p-robust a posteriori error estimates by broken patchwise equilibration for the curl–curl problem</i>	37
Jun Hu and Limin Ma , <i>Asymptotic expansions of eigenvalues by both the Crouzeix–Raviart and enriched Crouzeix–Raviart elements</i>	75
Wenbo Li and Ricardo H. Nochetto , <i>Two-scale methods for convex envelopes</i>	111
Xiaoli Li, Jie Shen, and Zhengguang Liu , <i>New SAV-pressure correction methods for the Navier-Stokes equations: stability and error analysis</i> .	141
Alexander Ostermann, Frédéric Rousset, and Katharina Schratz , <i>Error estimates at low regularity of splitting schemes for NLS</i>	169
Thomas Führer , <i>Multilevel decompositions and norms for negative order Sobolev spaces</i>	183
Chao Li and Xiaojun Chen , <i>Isotropic non-Lipschitz regularization for sparse representations of random fields on the sphere</i>	219
Barbara Kaltenbacher and William Rundell , <i>On an inverse problem of nonlinear imaging with fractional damping</i>	245
Elchin Hasanalizade, Quanli Shen, and Peng-Jie Wong , <i>Counting zeros of Dedekind zeta functions</i>	277
Kathrin Bringmann and Ben Kane , <i>Class numbers and representations by ternary quadratic forms with congruence conditions</i>	295
Jay Jorgenson, Lejla Smajlović, and Holger Then , <i>An approach for computing generators of class fields of imaginary quadratic number fields using the Schwarzian derivative</i>	331
Christopher Frei and Rodolphe Richard , <i>Constructing abelian extensions with prescribed norms</i>	381
Markus Kirschmer, Fabien Narbonne, Christophe Ritzenthaler, and Damien Robert , <i>Spanning the isogeny class of a power of an elliptic curve</i>	401
Mohamed Barakat and Markus Lange-Hegermann , <i>An algorithmic approach to Chevalley’s Theorem on images of rational morphisms between affine varieties</i>	451
Henry Cohn and Nicholas Triantafyllou , <i>Dual linear programming bounds for sphere packing via modular forms</i>	491

Patrick Henning and Johan Wärnegård, Superconvergence of time invariants for the Gross–Pitaevskii equation	509
Wolfgang Dahmen, Rob Stevenson, and Jan Westerdiep, Accuracy controlled data assimilation for parabolic problems	557
Ingeborg G. Gjerde and L. Ridgway Scott, Nitsche’s method for Navier–Stokes equations with slip boundary conditions	597
Qigang Liang and Xuejun Xu, A two-level preconditioned Helmholtz–Jacobi–Davidson method for the Maxwell eigenvalue problem	623
Patrick Farrell, Pablo Alexei Gazca Orozco, and Endre Süli, Finite element approximation and preconditioning for anisothermal flow of implicitly-constituted non-Newtonian fluids	659
Dow Drake, Jay Gopalakrishnan, Joachim Schöberl, and Christoph Wintersteiger, Convergence analysis of some tent-based schemes for linear hyperbolic systems	699
Weifeng Zhao, Strictly convex entropy and entropy stable schemes for reactive Euler equations	735
Jihong Wang, Jiwei Zhang, and Chunxiong Zheng, Stability and error analysis for a second-order approximation of 1D nonlocal Schrödinger equation under DtN-type boundary conditions	761
Dong Li, Chaoyu Quan, and Tao Tang, Stability and convergence analysis for the implicit-explicit method to the Cahn–Hilliard equation	785
Weizhu Bao, Yue Feng, and Chunmei Su, Uniform error bounds of time-splitting spectral methods for the long-time dynamics of the nonlinear Klein–Gordon equation with weak nonlinearity	811
Philippe Chartier, Mohammed Lemou, and Léopold Trémant, A uniformly accurate numerical method for a class of dissipative systems	843
Swaine L. Chen and Nico M. Temme, A distribution function from population genetics statistics using Stirling numbers of the first kind: Asymptotics, inversion and numerical evaluation	871
Lukas Sablica and Kurt Hornik, On bounds for Kummer’s function ratio	887
Yannick Saouter, New results for witnesses of Robin’s criterion	909
Alan Lauder and Jan Vonk, Computing p -adic L-functions of totally real fields	921
Sualeh Asif, Francesc Fité, and Dylan Pentland, contributor A. V. Sutherland, Computing L -polynomials of Picard curves from Cartier–Manin matrices	943
Elena Angelini and Luca Chiantini, Minimality and uniqueness for decompositions of specific ternary forms	973
Alexander Hulpke, The perfect groups of order up to two million	1007

Jianbo Cui, Luca Dieci, and Haomin Zhou, Time discretizations of Wasserstein–Hamiltonian flows	1019
--	------

Qingguo Hong, Yuwen Li, and Jinchao Xu, An extended Galerkin analysis infinite element exterior calculus	1077
Long Chen and Xuehai Huang, Finite elements for divdiv conforming symmetric tensors in three dimensions	1107
Arbaz Khan and Pietro Zanotti, A nonsymmetric approach and a quasi-optimal and robust discretization for the Biot’s model	1143
Antoine Benoit, Stability of finite difference schemes approximation for hyperbolic boundary value problems in an interval	1171
Yifei Wu and Fangyan Yao, A first-order Fourier integrator for the nonlinear Schrödinger equation on \mathbb{T} without loss of regularity	1213
Carlos Beltrán, Laurent Bétermin, Peter Grabner, and Stefan Steinerberger, How well-conditioned can the eigenvector problem be?	1237
Neil K. Chada and Xin T. Tong, Convergence acceleration of ensemble Kalman inversion in nonlinear settings	1247
Cécile Haberstick, Anthony Nouy, and Guillaume Perrin, Boosted optimal weighted least-squares	1281
Anne-Maria Ernvall-Hytönen and Neea Palojärvi, Explicit bound for the number of primes in arithmetic progressions assuming the Generalized Riemann Hypothesis	1317
David Harvey and Markus Hittmeir, A log-log speedup for exponent one-fifth deterministic integer factorisation	1367
Lassina Dembélé, On the existence of abelian surfaces with everywhere good reduction	1381
Razvan Barbulescu and Sudarshan Shinde, A classification of ECM-friendly families of elliptic curves using modular curves	1405
Lorenzo Paganì, Greenberg’s conjecture for real quadratic fields and the cyclotomic \mathbb{Z}_2-extensions	1437
Ö. Akgün, M. Mereb, and L. Vendramin, Enumeration of set-theoretic solutions to the Yang–Baxter equation	1469
Gunnar Brinkmann, Jan Goedgebeur, and Brendan D. McKay, The minimality of the Georges–Kelmans graph	1483
Eli Amzallag, Andrei Minchenko, and Gleb Pogudin, Degree bound for toric envelope of a linear algebraic group	1501
Tamiru Jarso and Tim Trudgian, Four consecutive primitive elements in a finite field	1521

Buyang Li, Maximum-norm stability of the finite element method for the Neumann problem in nonconvex polygons with locally refined mesh ..	1533
Arnold Reusken, Analysis of finite element methods for surface vector-Laplace eigenproblems	1587
Rami Masri, Chen Liu, and Beatrice Riviere, A discontinuous Galerkin pressure correction scheme for the incompressible Navier–Stokes equations: Stability and convergence	1625

Roland Maier and Barbara Verfürth , Multiscale scattering in nonlinear Kerr-type media	1655
Benjamin Dörich and Jan Leibold , Full discretization error analysis of exponential integrators for semilinear wave equations	1687
Lehel Banjai and Charalambos G. Makridakis , A posteriori error analysis for approximations of time-fractional subdiffusion problems ..	1711
S. Blanes, F. Casas, P. Chartier, and A. Escorihuela-Tomàs , On symmetric-conjugate composition methods in the numerical integration of differential equations	1739
Shuai Lu and Peter Mathé , Stochastic gradient descent for linear inverse problems in Hilbert spaces	1763
Olivier Zahm, Tiangang Cui, Kody Law, Alessio Spantini, and Youssef Marzouk , Certified dimension reduction in nonlinear Bayesian inverse problems	1789
Alexander D. Gilbert, Frances Y. Kuo, and Ian H. Sloan , Equivalence between Sobolev spaces of first-order dominating mixed smoothness and unanchored ANOVA spaces on \mathbb{R}^d	1837
Benjamin Doerr , A sharp discrepancy bound for jittered sampling	1871
Yinkun Wang and Shuhuang Xiang , Fast and stable augmented Levin methods for highly oscillatory and singular integrals	1893
Henrik Garde and Nuutti Hyvönen , Series reversion in Calderón's problem	1925
Michaela Cully-Hugill and Ethan S. Lee , Explicit interval estimates for prime numbers	1955
Alex Abreu, Sally Andria, and Marco Pacini , Abel maps for nodal curves via tropical geometry	1971
Christian Bingane and Charles Audet , The equilateral small octagon of maximal width	2027

Vol. 91, No. 337

September 2022

Carsten Carstensen and Stefan A. Sauter , Crouzeix-Raviart triangular elements are inf-sup stable	2041
Michael Feischl , Inf-sup stability implies quasi-orthogonality	2059
Long Chen and Xuehai Huang , A finite element elasticity complex in three dimensions	2095
Eduard Feireisl, Mária Lukáčová-Medvid'ová, Simon Schneider, and Bangwei She , Approximating viscosity solutions of the Euler system	2129
Alexander Rieder, Francisco–Javier Sayas, and Jens Markus Melenk , Time domain boundary integral equations and convolution quadrature for scattering by composite media	2165
María Cabrera Calvo, Frédéric Rousset, and Katharina Schratz , Time integrators for dispersive equations in the long wave regime	2197
Yan Wang and Xiaofei Zhao , A symmetric low-regularity integrator for nonlinear Klein-Gordon equation	2215

Timon S. Gutleb, José A. Carrillo, and Sheehan Olver, Computing equilibrium measures with power law kernels	2247
Jianbo Cui, Jialin Hong, and Derui Sheng, Density function of numerical solution of splitting AVF scheme for stochastic Langevin equation	2283
Diego Marques and Pavel Trojovský, Error estimates for a class of continuous Borse-type inequalities	2335
Oscar E. Quesada-Herrera, On the q-analogue of the Pair Correlation Conjecture via Fourier optimization	2347
Enis Kaya, Explicit Vologodsky integration for hyperelliptic curves	2367
Matías R. Bender and Simon Telen, Toric eigenvalue methods for solving sparse polynomial systems	2397
Akinari Hoshi, Kazuki Kanai, and Aiichi Yamasaki, Norm one Tori and Hasse norm principle	2431
Evelyne Hubert and Erick Rodriguez Bazan, Algorithms for fundamental invariants and equivariants of finite groups	2459
Mathieu Rosenfeld, Avoiding squares over words with lists of size three amongst four symbols	2489

Vol. 91, No. 338

November 2022

Dong Li, Why large time-stepping methods for the Cahn-Hilliard equation is stable	2501
Bo Gong, Jiguang Sun, Tiara Turner, and Chunxiong Zheng, Finite element/holomorphic operator function method for the transmission eigenvalue problem	2517
Chupeng Ma and Robert Scheichl, Error estimates for discrete generalized FEMs with locally optimal spectral approximations	2539
Johnny Guzmán, Anna Lischke, and Michael Neilan, Exact sequences on Worsley–Farin splits	2571
Wansheng Wang and Lijun Yi, Delay-dependent elliptic reconstruction and optimal $L^\infty(L^2)$ a posteriori error estimates for fully discrete delay parabolic problems	2609
Bruno Després, Maria El Ghaoui, and Toni Sayah, A Trefftz method with reconstruction of the normal derivative applied to elliptic equations	2645
Assyr Abdulle, Marcus J. Grote, and Giacomo Rosillo de Souza, Explicit stabilized multirate method for stiff differential equations	2681
David Krieg, Erich Novak, and Mathias Sonleitner, Recovery of Sobolev functions restricted to iid sampling	2715
Elisenda Feliu and AmirHosein Sadeghimanesh, Kac-Rice formulas and the number of solutions of parametrized systems of polynomial equations	2739
Josef Dick, Takashi Goda, and Kosuke Suzuki, Component-by-component construction of randomized rank-1 lattice rules achieving almost the optimal randomized error rate	2771
Sotirios E. Notaris, Anti-Gaussian quadrature formulae of Chebyshev type	2803

Ariel Pacetti and Lucas Villagra Torcomian , Q-Curves, Hecke characters and some Diophantine equations	2817
Thomas Rüd , Explicit Tamagawa numbers for certain algebraic tori over number fields	2867
Colin Faverjon and Marina Poulet , An algorithm to recognize regular singular Mahler systems	2905
James Rickards , Improved computation of fundamental domains for arithmetic Fuchsian groups	2929
Guillem Blanco , An algorithm for Hodge ideals	2955
Sandra Di Rocco, David Eklund, and Oliver Gäfvert , Sampling and homology via bottlenecks	2969

Editorial Information

Information on the backlog for this journal can be found on the AMS website starting from <http://www.ams.org/mcom>.

In an effort to make articles available as quickly as possible, articles are electronically published on the AMS website individually after proof is returned from authors and before appearing in an issue.

A Consent to Publish is required before we can begin processing your paper. After a paper is accepted for publication, the Providence office will send a Consent to Publish and Copyright Agreement to all authors of the paper. By submitting a paper to this journal, authors certify that the results have not been submitted to nor are they under consideration for publication by another journal, conference proceedings, or similar publication.

Information for Authors

Initial submission. All articles submitted to this journal are peer-reviewed. The AMS has a single blind peer-review process in which the reviewers know who the authors of the manuscript are, but the authors do not have access to the information on who the peer reviewers are. The AMS uses Centralized Manuscript Processing for initial submission. Authors should submit a PDF file using the Initial Manuscript Submission form found at www.ams.org/submission/mcom, or send one copy of the manuscript to the following address: Centralized Manuscript Processing, MATHEMATICS OF COMPUTATION, 201 Charles Street, Providence, RI 02904-2213 USA. If a paper copy is being forwarded to the AMS, indicate that it is for *Mathematics of Computation* and include the name of the corresponding author and contact information, such as an email address or mailing address. The author may suggest an appropriate editor for his or her paper.

The first page must consist of a *descriptive title*, followed by an *abstract* that summarizes the article in language suitable for workers in the general field (algebra, analysis, etc.). The *descriptive title* should be short, but informative; useless or vague phrases such as “some remarks about” or “concerning” should be avoided. The *abstract* must be brief, reasonably self-contained, and not exceed 300 words. Included with the footnotes to the paper should be the 2010 *Mathematics Subject Classification* representing the primary and secondary subjects of the article. The classifications are accessible from www.ams.org/msc/. The Mathematics Subject Classification footnote may be followed by a list of *key words and phrases* describing the subject matter of the article and taken from it. Journal abbreviations used in bibliographies are listed in the latest *Mathematical Reviews* annual index. The series abbreviations are also accessible from www.ams.org/mshtml/serials.pdf. To help in preparing and verifying references, the AMS offers MR Lookup, a Reference Tool for Linking, at www.ams.org/mrlookup/.

Electronically prepared manuscripts. Manuscripts should be electronically prepared in $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$. To this end, the Society has prepared $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ author packages for each AMS publication. Author packages include instructions for preparing electronic manuscripts, samples, and a style file that generates the particular design specifications of that publication series. Articles properly prepared using the $\mathcal{A}\mathcal{M}\mathcal{S}\text{-}\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ style file and the `\label` and `\ref` commands automatically enable extensive intra-document linking to the bibliography and other elements of the article for searching electronically on the Web.

Authors may retrieve an author package for *Mathematics of Computation* from www.ams.org/mcom/mcomauthorpac.html. The *AMS Author Handbook* is available in PDF format from the author package link. The author package can also be obtained free of charge by sending email to tech-support@ams.org or from the Publication Division, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2213 USA. When requesting an author package, please specify the publication in which your paper will appear. Please be sure to include your complete email address.

After acceptance. The source files for the final version of the electronic manuscript should be sent to the Providence office immediately after the paper has been accepted for publication. The author should also submit a PDF of the final version of the paper to the Managing Editor, who will forward a copy to the Providence office. Accepted electronically prepared manuscripts can be submitted via the web at www.ams.org/submit-book-journal/, sent via email to pub-submit@ams.org, or sent on CD to the Electronic Prepress Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2213 USA. When sending a manuscript electronically via email or CD, please be sure to include a message indicating in which publication the paper has been accepted. Complete instructions on how to send files are included in the author package.

Electronic graphics. Comprehensive instructions on preparing graphics are available starting from www.ams.org/authors/journals.html. A few of the major requirements are given here.

Submit files for graphics as EPS (Encapsulated PostScript) files. This includes graphics originated via a graphics application as well as scanned photographs or other computer-generated images. If this is not possible, TIFF files are acceptable as long as they can be opened in Adobe Photoshop or Illustrator.

Authors using graphics packages for the creation of electronic art should also avoid the use of any lines thinner than 0.5 points in width. Many graphics packages allow the user to specify a “hairline” for a very thin line. Hairlines often look acceptable when proofed on a typical laser printer. However, when produced on a high-resolution laser imagesetter, hairlines become nearly invisible and will be lost entirely in the final printing process.

Screens should be set to values between 15% and 85%. Screens which fall outside of this range are too light or too dark to print correctly. Variations of screens within a graphic should be no less than 10%.

Any graphics created in color will be rendered in grayscale for the printed version unless color printing is authorized by the Managing Editor and the Publisher. In general, color graphics will appear in color in the online version.

AMS policy on making changes to articles after publication. Articles are published on the AMS website individually after proof is returned from authors and before appearing in an issue. To preserve the integrity of electronically published articles, once an article is individually published to the AMS website, changes cannot be made in place in the paper. The AMS does not keep author-related information, such as affiliation, current address, and email address, up to date after a paper is electronically published.

Corrections of critical errors may be made to the paper by submitting an errata article to the Editor. The errata article will be published electronically, will appear in a future print issue, and will link back and forth on the Web with the original article.

Secure manuscript tracking on the Web. Authors can track their manuscripts through the AMS journal production process using the personal AMS ID and Article ID printed in the upper right-hand corner of the Consent to Publish form sent to each author who publishes in AMS journals. Access to the tracking system is available from www.ams.org/mstrack/. An explanation of each production step is provided on the web through links from the manuscript tracking screen. Questions can be sent to mcom-query@ams.org.

Inquiries. Any inquiries concerning a paper that has been accepted for publication that cannot be answered via the manuscript tracking system mentioned above should be sent to mcom-query@ams.org or directly to the Electronic Prepress Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2213 USA.

Editorial Committee

SUSANNE C. BRENNER, Chair, Center for Computation & Technology and Department of Mathematics, Louisiana State University, Baton Rouge, LA 70803 USA; *E-mail*: mathcomp@math.lsu.edu

MICHAEL J. MOSSINGHOFF, Center for Communications Research, 805 Bunn Dr., Princeton, NJ 08540 USA; *E-mail*: m.mossinghoff@idaccr.org

MICHAEL J. NEILAN, Department of Mathematics, University of Pittsburgh, Pittsburgh, PA 15260 USA; *E-mail*: neilan@pitt.edu

DANIEL B. SZYLD, Department of Mathematics 038-16, Temple University, 638 Wachman, 1805 N. Broad St. Philadelphia, PA 19122-6094 USA; *E-mail*: szyld@temple.edu

Board of Associate Editors

PAOLA F. ANTONIETTI, Dipartimento di Matematica, Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milano, Italy; *E-mail*: paola.antonietti@polimi.it

MARKUS BACHMAYR, Institut für Mathematik, Johannes Gutenberg Universität Mainz, 55128 Mainz, Germany; *E-mail*: bachmayr@uni-mainz.de

JENNIFER BALAKRISHNAN, Department of Mathematics and Statistics, Boston University, 11 Cummington Mall, Boston, MA 02215 USA; *E-mail*: jbala@bu.edu

ERNESTO G. BIRGIN, Department of Computer Science, University of São Paulo, Rua de Matão, São Paulo - SP 05508-090, Brazil; *E-mail*: ebirgin@ime.usp.br

MARTIN BURGER, Department Mathematik, Friedrich-Alexander-Universität Erlangen-Nürnberg, Cauerstrasse 11, 91058 Erlangen, Germany; *E-mail*: martin.burger@fau.de

CORALIA CARTIS, Mathematical Institute, University of Oxford, Andrew Wiles Building, Woodstock Road, Oxford OX2 6GG, England; *E-mail*: Coralia.Cartis@maths.ox.ac.uk

RONALD F. A. COOLS, Department of Computer Science, Katholieke Universiteit Leuven, Celestijnenlaan 200A, B-3001 Heverlee, Belgium; *E-mail*: ronald.cools@cs.kuleuven.ac.be

ALAN DEMLOW, Department of Mathematics, Texas A&M University, Mailstop 3368, College Station, TX 77843 USA; *E-mail*: demlow@math.tamu.edu

BRUNO DESPRES, University of Paris VI, Laboratory Jacques-Louis Lions, 175 rue du Chevaleret, 75013 Paris, France; *E-mail*: despres@ljl1.math.upmc.fr

ALICIA DICKENSTEIN, Departamento de Matemática, FCEN, University of Buenos Aires, Ciudad Universitaria, Pab. I, C1428EGA Buenos Aires, Argentina; *E-mail*: alidick@dm.uba.ar

JAN DRAISMA, Mathematical Institute, University of Bern, Sidlerstrasse 5, 3012 Bern Switzerland; *E-mail*: jan.draisma@math.unibe.ch

QIANG DU, Columbia University, 500 W 120th Street, APAM, 200 Mudd, MC 4701, New York, NY 10027 USA; *E-mail*: qd2125@columbia.edu

BETTINA EICK, Institut Computational Mathematics, University of Braunschweig, 38106 Braunschweig, Germany; *E-mail*: beick@tu-bs.de

HOWARD C. ELMAN, Department of Computer Science, University of Maryland, College Park, MD 20742 USA; *E-mail*: elman@cs.umd.edu

KEVIN HARE, Department of Pure Mathematics, University of Waterloo, 200 University Ave. W, Waterloo ON N2L 3G1, Canada; *E-mail*: kghare@uwaterloo.ca

RALF HIPTMAIR, Department of Mathematics, Seminar of Applied Mathematics, ETH Zurich, CH-8092 Zurich, Switzerland. *E-mail*: hiptmair@sam.math.ethz.ch

FRANCES KUO, University of New South Wales, School of Mathematics, Sydney NSW 2052, Australia; *E-mail*: f.kuo@unsw.edu.au

BUYANG LI, Department of Applied Mathematics, The Hong Kong Polytechnic University, Hong Kong; *E-mail*: buyang.li@polyu.edu.hk

CHRISTIAN LUBICH, Mathematisches Institut, Universität Tübingen, Auf der Morgenstelle 10, 72076 Tübingen, Germany; *E-mail*: lubich@na.uni-tuebingen.de

ANDREI MARTÍNEZ-FINKELSHTEIN, Department of Mathematics, Baylor University, Waco, TX 76798 USA; and Department of Mathematics, University of Almeria, 04120 Almeria, Spain; *E-mail*: a.martinez-finkelshtein@baylor.edu

JENS MARKUS MELENK, Institute of Analysis and Scientific Computing, Technische Universität Wien, Wiedner Hauptstrasse 8-10, A-1040 Vienna, Austria; *E-mail*: melenk@tuwien.ac.at

FABIO NOBILE, Mathematics Institute of Computational Science and Engineering, École Polytechnique Fédérale de Lausanne, CH 1015 Lausanne, Switzerland; *E-mail*: fabio.nobile@epfl.ch

ADAM M. OBERMAN, Department of Mathematics and Statistics, McGill University, 805 Sherbrooke St W, Montreal QC H3A 0B9, Canada; *E-mail*: adam.oberman@mcgill.ca

DANIEL PETERSEIM, Institute of Mathematics, University of Augsburg, Universitätsstrasse 12a, 86159 Augsburg, Germany; *E-mail*: daniel.peterseim@math.uni-augsburg.de

ROBERT SCHEICHL, Institute for Applied Mathematics, University of Heidelberg, Im Neuenheimer Feld 205, 69120 Heidelberg, Germany; *E-mail*: r.scheichl@uni-heidelberg.de

CHI-WANG SHU, Applied Mathematics Division, Brown University, P.O. Box F, 182 George St., Providence, RI 02912-0001 USA; *E-mail*: Chi-Wang_Shu@brown.edu

IGOR E. SHPARLINSKI, Department of Pure Mathematics, University of New South Wales, Sydney, NSW 2052, Australia; *E-mail*: igor.shparlinski@unsw.edu.au

ANDREW V. SUTHERLAND, Department of Mathematics, Massachusetts Institute of Technology, Cambridge, MA 02139 USA; *E-mail*: drew@math.mit.edu

MATHEMATICS OF COMPUTATION
CONTENTS

Vol. 91, No. 338

November 2022

Dong Li, Why large time-stepping methods for the Cahn-Hilliard equation is stable	2501
Bo Gong, Jiguang Sun, Tiara Turner, and Chunxiong Zheng, Finite element/holomorphic operator function method for the transmission eigenvalue problem	2517
Chupeng Ma and Robert Scheichl, Error estimates for discrete generalized FEMs with locally optimal spectral approximations	2539
Johnny Guzmán, Anna Lischke, and Michael Neilan, Exact sequences on Worsley–Farin splits	2571
Wansheng Wang and Lijun Yi, Delay-dependent elliptic reconstruction and optimal $L^\infty(L^2)$ a posteriori error estimates for fully discrete delay parabolic problems	2609
Bruno Després, Maria El Ghaoui, and Toni Sayah, A Trefftz method with reconstruction of the normal derivative applied to elliptic equations	2645
Assyr Abdulle, Marcus J. Grote, and Giacomo Rosilho de Souza, Explicit stabilized multirate method for stiff differential equations	2681
David Krieg, Erich Novak, and Mathias Sonnleitner, Recovery of Sobolev functions restricted to iid sampling	2715
Elisenda Feliu and AmirHosein Sadeghimanesh, Kac-Rice formulas and the number of solutions of parametrized systems of polynomial equations	2739
Josef Dick, Takashi Goda, and Kosuke Suzuki, Component-by-component construction of randomized rank-1 lattice rules achieving almost the optimal randomized error rate	2771
Sotirios E. Notaris, Anti-Gaussian quadrature formulae of Chebyshev type	2803
Ariel Pacetti and Lucas Villagra Torcomian, \mathbb{Q} -Curves, Hecke characters and some Diophantine equations	2817
Thomas Rüd, Explicit Tamagawa numbers for certain algebraic tori over number fields	2867
Colin Faverjon and Marina Poulet, An algorithm to recognize regular singular Mahler systems	2905
James Rickards, Improved computation of fundamental domains for arithmetic Fuchsian groups	2929
Guillem Blanco, An algorithm for Hodge ideals	2955
Sandra Di Rocco, David Eklund, and Oliver Gäfvert, Sampling and homology via bottlenecks	2969



0025-5718(202211)91:338*;1-Y

