



BULLETIN

(NEW SERIES)

of the

AMERICAN MATHEMATICAL SOCIETY

The AMS was founded in 1888

Editors

Articles

Susan Friedlander, *Chief Editor*

Book Reviews

Volodymyr Nekrashevych

VOLUME 57

NUMBER 4

OCTOBER 2020

Available electronically at
www.ams.org/bull/

Bulletin (New Series) of the American Mathematical Society

The *Bulletin* publishes expository articles on contemporary mathematical research written in a way that gives insight to mathematicians who may not be experts in the particular topic. The *Bulletin* publishes, by invitation only, reviews of selected books in mathematics and short articles in the “Mathematical Perspectives” section.

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. *Bulletin (New Series) of the American Mathematical Society* is published quarterly. It is available electronically from www.ams.org/journals/. For paper delivery, subscription prices for Volume 57 (2020) are US\$675 list, US\$540 institutional member, US\$405 individual member, US\$607.50 corporate member. The subscription price for members is included in the annual dues. Subscription renewals are subject to late fees. See www.ams.org/journal-faq for more journal subscription information. If ordering the paper version, add US\$5.00 for delivery within the United States; US\$8.00 for delivery outside the United States.

Back number information. For back issues see 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 the American Mathematical Society, 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.

Bulletin (New Series) of the American Mathematical Society (ISSN 0273-0979 (print); ISSN 1088-9485 (online)) is published quarterly by the American Mathematical Society at 201 Charles Street, Providence, RI 02904-2213 USA. Periodicals postage is paid at Providence, Rhode Island, and additional mailing offices. POSTMASTER: Send address changes to *Bulletin (New Series) of the American Mathematical Society*, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2213 USA.

© 2020 American Mathematical Society. All rights reserved.

This journal is indexed in *Mathematical Reviews*, *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*.

Printed in the United States of America.

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

10 9 8 7 6 5 4 3 2 1 25 24 23 22 21 20

BULLETIN OF THE AMERICAN MATHEMATICAL SOCIETY
CONTENTS

Vol. 57, No. 4

October 2020

ARTICLES

- Charles Fefferman, Alex Ionescu, Terence Tao, and Stephen Wainger, with contributions from Loredana Lanzani, Akos Magyar, Mariusz Mirek, Alexander Nagel, D. H. Phong, Lillian Pierce, Fulvio Ricci, Christopher Sogge, and Brian Street, [Analysis and applications: The mathematical work of Elias Stein](#) 523
- Charles M. Newman and Wei Wu, [Constants of de Bruijn–Newman type in analytic number theory and statistical physics](#) 595
- Rohan Karthikeyan, Siddharth Sinha, and Vallabh Patil, [On the resolution of the sensitivity conjecture](#) 615

MATHEMATICAL PERSPECTIVES

- Charlie Fefferman, [About the cover: Tribute to Elias Stein](#) 639
- [Selected Mathematical Reviews](#) 641

BOOK REVIEWS

- Richard Montgomery (Reviewer), [A comprehensive introduction to sub-Riemannian geometry. From the Hamiltonian viewpoint](#), by Andrei Agrachev, Davide Barilari, and Ugo Boscain 657
- John E. McCarthy (Reviewer), [Loewner’s theorem on monotone matrix functions](#), by Barry Simon 679

INDEX TO VOLUME 57 (2020)

BULLETIN ARTICLES

- Bonifant, Araceli, and John Milnor. *Group actions, divisors, and plane curves*, 171
- Caffarelli, Luis A., and Yannick Sire. *Minimal surfaces and free boundaries: Recent developments*, 91
- Caporaso, Lucia. *Compactifying moduli spaces*, 455
- Corwin, Ivan, and Hao Shen. *Some recent progress in singular stochastic partial differential equations*, 409
- Ein, Lawrence, and Robert Lazarsfeld. *Tangent developable surfaces and the equations defining algebraic curves*, 23
- Fefferman, Charles, Alex Ionescu, Terence Tao, and Stephen Wainger, with contributions from Loredana Lanzani, Akos Magyar, Mariusz Mirek, Alexander Nagel, D. H. Phong, Lillian Pierce, Fulvio Ricci, Christopher Sogge, and Brian Street. *Analysis and applications: The mathematical work of Elias Stein*, 523
- Friedlander, Eric M., and Alexander S. Merkurjev. *The mathematics of Andrei Suslin*, 1
- Ibarra, Sergio Rom  a. *See* Moreira, Carlos Gustavo T.
- Ionescu, Alex. *See* Fefferman, Charles
- Karthikeyan, Rohan, Siddharth Sinha, and Vallabh Patil. *On the resolution of the sensitivity conjecture*, 615
- Lanzani, Loredana. *See* Fefferman, Charles
- Lazarsfeld, Robert. *See* Ein, Lawrence
- Magyar, Akos. *See* Fefferman, Charles
- Merkurjev, Alexander S. *See* Friedlander, Eric M.
- Milnor, John. *See* Bonifant, Araceli
- Mirek, Mariusz. *See* Fefferman, Charles
- Moreira, Carlos Gustavo T., Maria Jos   Pacifico, and Sergio Rom  a Ibarra. *Hausdorff dimension, Lagrange and Markov dynamical spectra for geometric Lorenz attractors*, 269
- Nagel, Alexander. *See* Fefferman, Charles
- Newman, Charles M., and Wei Wu. *Constants of de Bruijn–Newman type in analytic number theory and statistical physics*, 595
- Pacifico, Maria Jos  . *See* Moreira, Carlos Gustavo T.
- Patil, Vallabh. *See* Karthikeyan, Rohan
- Phong, D. H. *See* Fefferman, Charles
- Pierce, Lillian. *See* Fefferman, Charles
- Ricci, Fulvio. *See* Fefferman, Charles
- Shen, Hao. *See* Corwin, Ivan
- Sinha, Siddharth. *See* Karthikeyan, Rohan
- Sire, Yannick. *See* Caffarelli, Luis A.
- Sogge, Christopher. *See* Fefferman, Charles
- Street, Brian. *See* Fefferman, Charles
- Tao, Terence. *See* Fefferman, Charles
- Vidick, Thomas. *Verifying quantum computations at scale: A cryptographic leash on quantum devices*, 39
- Vondr  k, Jan. *In memoriam: Maryam Mirzakhani*, 357
- Wainger, Stephen. *See* Fefferman, Charles
- van Willigenburg, Stephanie. *The shuffle conjecture*, 77
- Wright, Alex. *A tour through Mirzakhani’s work on moduli spaces of Riemann surfaces*, 359
- Wu, Wei. *See* Newman, Charles M.

MATHEMATICAL PERSPECTIVES

- Dragovi  , Vladimir, and Irina Goryuchkina. *About the cover: The Fine–Petrovi   polygons and the Newton–Puiseux method for algebraic ordinary differential equations*, 293
- Fefferman, Charlie. *About the cover: Tribute to Elias Stein*, 639
- Friedlander, Eric M. *About the cover: Andrei Suslin, 1950–2018*, 107
- Goryuchkina, Irina. *See* Dragovi  , Vladimir

BOOK REVIEWS

- Agrachev, Andrei, Davide Barilari, and Ugo Boscain, with an Appendix by Igor Zelenko. *A comprehensive introduction to sub-Riemannian geometry. From the Hamiltonian viewpoint*, reviewed by Richard Montgomery, 657

- Baik, Jinho, Percy Deift, and Toufic Suidan. *Combinatorics and random matrix theory*, reviewed by Terence Tao, 161
- Barilari, Davide. *See* Agrachev, Andrei
- Boscain, Ugo. *See* Agrachev, Andrei
- Bray, Erik. *See* Zimmermann, Paul
- Casamayou, Alexandre. *See* Zimmermann, Paul
- Ceccherini-Silberstein, Tullio, Fabio Scarabotti, and Filippo Tolli. *Discrete harmonic analysis*, reviewed by Rostislav Grigorchuk, 325
- Cohen, Nathann. *See* Zimmermann, Paul
- Connan, Guillaume. *See* Zimmermann, Paul
- Cremona, John. *See* Zimmermann, Paul
- Deift, Percy. *See* Baik, Jinho
- Dumont, Thierry. *See* Zimmermann, Paul
- Erdős, L., and H. T. Yau. *Dynamical approach to random matrix theory*, reviewed by Terence Tao, 161
- Forets, Marcelo. *See* Zimmermann, Paul
- Fousse, Laurent. *See* Zimmermann, Paul
- Ghitza, Alexandru. *See* Zimmermann, Paul
- Ghrist, Robert W. *Elementary applied topology*, reviewed by José A. Perea, 153
- Ikromov, Isroil A., and Detlef Müller. *Fourier restriction for hypersurfaces in three dimensions and Newton polyhedra*, reviewed by Andreas Seeger, 145
- Landsberg, J. M. *Geometry and complexity theory*, reviewed by Mateusz Michałek, 317
- Linnebo, Øystein. *Philosophy of Mathematics*, reviewed by Robert P. Crease, 129
- Maltey, François. *See* Zimmermann, Paul
- Meulien, Matthias. *See* Zimmermann, Paul
- Mezzarobba, Marc. *See* Zimmermann, Paul
- Moore, John Douglas. *Introduction to global analysis. Minimal surfaces in Riemannian manifolds*, reviewed by Tobias Holck Colding, 353
- Müller, Detlef. *See* Ikromov, Isroil A.
- Mumford, David, and Tadao Oda. *Algebraic geometry II*, reviewed by Scott Nollet, 133
- Nikolski, Nikolai. *Hardy spaces*, reviewed by William T. Ross, 347
- Oda, Tadao. *See* Mumford, David
- Oudot, Steve Y. *Persistence theory: From quiver representations to data analysis*, reviewed by José A. Perea, 153
- Pernet, Clément. *See* Zimmermann, Paul
- Scarabotti, Fabio. *See* Ceccherini-Silberstein, Tullio
- Shen, Alexander, Vladimir A. Uspensky, and Nikolay K. Vereshchagin. *Kolmogorov complexity and algorithmic randomness*, reviewed by J. Maurice Rojas, 339
- Simon, Barry. *Loewner's theorem on monotone matrix functions*, reviewed by John E. McCarthy, 679
- Suidan, Toufic. *See* Baik, Jinho
- Thiéry, Nicolas M. *See* Zimmermann, Paul
- Thomas, Hugh. *See* Zimmermann, Paul
- Tolli, Filippo. *See* Ceccherini-Silberstein, Tullio
- Uspensky, Vladimir A. *See* Shen, Alexander
- Vereshchagin, Nikolay K. *See* Shen, Alexander
- Wainwright, Martin J. *High-dimensional statistics: A non-asymptotic viewpoint*, reviewed by Po-Ling Loh, 509
- Yau, H. T. *See* Erdős, L.
- Zelenko, Igor. *See* Agrachev, Andrei
- Zimmermann, Paul, Alexandre Casamayou, Nathann Cohen, Guillaume Connan, Thierry Dumont, Laurent Fousse, François Maltey, Matthias Meulien, Marc Mezzarobba, Clément Pernet, Nicolas M. Thiéry, Erik Bray, John Cremona, Marcelo Forets, Alexandru Ghitza, and Hugh Thomas. *Computational Mathematics with SageMath*, reviewed by John B. Little, 515

BULLETIN

(NEW SERIES)

of the

AMERICAN MATHEMATICAL SOCIETY

*The AMS was founded in 1888***EDITORS**Susan Friedlander, *Chief Editor*Volodymyr Nekrashevych, *Book Reviews***ASSOCIATE EDITORS**

Emmanuel Candes

Ivan Z. Corwin

David Cox

Mark Embree

Daniel S. Freed

Edward Frenkel

Irene M. Gamba

Mark Goresky

Andrew J. Granville

Robert M. Guralnick

Herwig Hauser

Lisa Jeffrey

Bryna Kra

Steven G. Krantz

Peter Kuchment

William P. Minicozzi II

Ken Ono

Philip E. Protter

Israel Michael Sigal

Ulrike Tillmann

Burt Totaro

Yuri Tschinkel

Maciej Zworski

CONSULTANTS TO THE EDITORS

Gerald L. Alexanderson

Edward Dunne

PROVIDENCE, RHODE ISLAND USA

ISSN 0273-0979

Available electronically at
www.ams.org/bull/

BULLETIN OF THE AMERICAN MATHEMATICAL SOCIETY
CONTENTS

Vol. 57, No. 1

January 2020

Articles

Eric M. Friedlander and Alexander S. Merkurjev, The mathematics of Andrei Suslin	1
Lawrence Ein and Robert Lazarsfeld, Tangent developable surfaces and the equations defining algebraic curves	23
Thomas Vidick, Verifying quantum computations at scale: A cryptographic leash on quantum devices	39
Stephanie van Willigenburg, The shuffle conjecture	77
Luis A. Caffarelli and Yannick Sire, Minimal surfaces and free boundaries: Recent developments	91

Mathematical Perspectives

Eric M. Friedlander, About the cover: Andrei Suslin, 1950–2018	107
Selected Mathematical Reviews	111

Book Reviews

Robert P. Crease (Reviewer), Philosophy of Mathematics , by Øystein Linnebo	129
Scott Nollet (Reviewer), Algebraic geometry II , by David Mumford and Tadao Oda	133
Andreas Seeger (Reviewer), Fourier restriction for hypersurfaces in three dimensions and Newton polyhedra , by Isroil A. Ikromov and Detlef Müller	145
José A. Perea (Reviewer), Elementary applied topology , by Robert W. Ghrist; Persistence theory: From quiver representations to data analysis , by Steve Y. Oudot	153
Terence Tao (Reviewer), Combinatorics and random matrix theory , by Jinho Baik, Percy Deift, and Toufic Suidan; Dynamical approach to random matrix theory , by L. Erdős and H. T. Yau	161

Vol. 57, No. 2

April 2020

Articles

Araceli Bonifant and John Milnor, Group actions, divisors, and plane curves	171
Carlos Gustavo T. Moreira, Maria José Pacifico, and Sergio Romaña Ibarra, Hausdorff dimension, Lagrange and Markov dynamical spectra for geometric Lorenz attractors	269

Mathematical Perspectives

Vladimir Dragović and Irina Goryuchkina , About the cover: The Fine–Petrović polygons and the Newton–Puiseux method for algebraic ordinary differential equations	293
Selected Mathematical Reviews	301

Book Reviews

Mateusz Michałek (Reviewer), Geometry and complexity theory , by J. M. Landsberg	317
Rostislav Grigorchuk (Reviewer), Discrete harmonic analysis , by Tullio Ceccherini-Silberstein, Fabio Scarabotti, and Filippo Tolli	325
J. Maurice Rojas (Reviewer), Kolmogorov complexity and algorithmic randomness , by Alexander Shen, Vladimir A. Uspensky, and Nikolay K. Vereshchagin	339
William T. Ross (Reviewer), Hardy spaces , by Nikolai Nikolski	347
Tobias Holck Colding (Reviewer), Introduction to global analysis. Minimal surfaces in Riemannian manifolds , by John Douglas Moore	353

Vol. 57, No. 3

July 2020

Articles

Jan Vondrák , In memoriam: Maryam Mirzakhani	357
Alex Wright , A tour through Mirzakhani’s work on moduli spaces of Riemann surfaces	359
Ivan Corwin and Hao Shen , Some recent progress in singular stochastic partial differential equations	409
Lucia Caporaso , Compactifying moduli spaces	455

Mathematical Perspectives

Selected Mathematical Reviews	483
---	-----

Book Reviews

Po-Ling Loh (Reviewer), High-dimensional statistics: A non-asymptotic viewpoint , by Martin J. Wainwright	509
John B. Little (Reviewer), Computational Mathematics with SageMath , by Paul Zimmermann, Alexandre Casamayou, Nathann Cohen, Guillaume Connan, Thierry Dumont, Laurent Fousse, François Maltey, Matthias Meulien, Marc Mezzarobba, Clément Pernet, Nicolas M. Thiéry, Erik Bray, John Cremona, Marcelo Forets, Alexandru Ghitza, and Hugh Thomas	515

Articles

Charles Fefferman, Alex Ionescu, Terence Tao, and Stephen Wainger, with contributions from Loredana Lanzani, Akos Magyar, Mariusz Mirek, Alexander Nagel, D. H. Phong, Lillian Pierce, Fulvio Ricci, Christopher Sogge, and Brian Street, [Analysis and applications: The mathematical work of Elias Stein](#) 523

Charles M. Newman and Wei Wu, [Constants of de Bruijn–Newman type in analytic number theory and statistical physics](#) 595

Rohan Karthikeyan, Siddharth Sinha, and Vallabh Patil, [On the resolution of the sensitivity conjecture](#) 615

Mathematical Perspectives

Charlie Fefferman, [About the cover: Tribute to Elias Stein](#) 639

[Selected Mathematical Reviews](#) 641

Book Reviews

Richard Montgomery (Reviewer), [A comprehensive introduction to sub-Riemannian geometry. From the Hamiltonian viewpoint](#), by Andrei Agrachev, Davide Barilari, and Ugo Boscain 657

John E. McCarthy (Reviewer), [Loewner’s theorem on monotone matrix functions](#), by Barry Simon 679

Editorial Board for Articles

Emmanuel Candes
Ivan Z. Corwin
Daniel S. Freed
Edward Frenkel
Susan Friedlander, Chair
Irene M. Gamba
Mark Goresky
Andrew Granville

Robert M. Guralnick
Herwig Hauser
Bryna R. Kra
William P. Minicozzi II
Ulrike Tillmann
Burt Totaro
Yuri Tschinkel
Maciej Zworski

Editorial Board for Book Reviews

David A. Cox
Mark Embree
Lisa Claire Jeffrey
Steven G. Krantz
Peter Kuchment

Volodymyr Nekrashevych, Chair
Ken Ono
Philip Protter
Israel Michael Sigal

Consultants to the Editors

Gerald L. Alexanderson
Edward G. Dunne

Chief Editor: Susan Friedlander

Editorial Information

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

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 form 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

The *Bulletin* publishes expository articles on contemporary mathematical research written in a way that gives insight to mathematicians who may not be experts in the particular topic. 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 manuscripts are, but the authors do not have access to information on who the peer reviewers are.

The first page must consist of a short *descriptive title*, followed by an *abstract* that summarizes the article in language suitable for mathematicians in the general area. The *descriptive title* should be short but informative; useless or vague phrases such as “some remarks about” or “concerning” should be avoided. The *abstract* should be a brief technical description of the new material.

A well-written expository article will include motivating problems and examples, some indication of the historical development of the subject, and of course the results and open problems that make it an interesting and exciting area of mathematics. In most cases proofs should be at most briefly sketched, and there should be a good bibliography whose main aim is to help those wishing to pursue the subject further. Articles reporting on recent mathematical research should include an introductory section addressed to nonexperts describing the motivation, background, and significance of the results announced.

Following the statement of results, there should be a sketch of proofs that may be addressed to experts, including elements of the proof which are novel. References should be given so that an interested reader can find the details.

Each paper should include a footnote with 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/msnhtml/serials.pdf. To help in preparing and verifying references, the AMS offers MR Lookup, a Reference Tool for Linking, at www.ams.org/mrlookup/. When the manuscript is submitted, authors should supply the Editor with electronic addresses if available.

Mathematicians giving AMS lectures (Gibbs Lectures, Colloquium Lectures, and Progress in Mathematics Lectures) or invited hour addresses at meetings of the Society are encouraged to write up their lectures using the guidelines for expository articles described above. Submissions will be reviewed by the Editorial Board for Articles, and authors will be notified of its decision.

Book Reviews are by invitation only. The first page must include the title of the book being reviewed; the name(s) of the author(s); publisher; city of publication; year of publication; number of pages, including front matter; price if known; and ISBN. There should also be a footnote with the 2010 *Mathematics Subject Classification* representing the primary and secondary subjects of the book under review. The classifications are accessible from www.ams.org/msc/. To help in preparing and verifying references, the AMS offers MR Lookup, a Reference Tool for Linking, at www.ams.org/mrlookup/.

Initial submission. Authors of articles may submit manuscripts for consideration as PDF files at <http://www.ams.org/peer-review/submission.pl>. Manuscripts must be a single file with images embedded. Authors will have a chance to view the manuscript and data entered before releasing the manuscript into the system. Two-digit 2010 *Mathematics Subject Classification* numbers are included in a pull-down menu; classifications are accessible from <http://www.ams.org/msc/>. Complete author instructions are available at the site.

Authors who cannot supply a PDF file may submit a paper copy of their manuscript to *Bulletin*/Peer-Review Manuscript Submissions, 201 Charles Street, Providence, RI 02904-2213 USA. These submissions will be scanned into a PDF file and entered by AMS staff into the peer-review system. All the data required in the submission form must be provided to avoid delays in publishing the manuscript.

The *Bulletin* Chief Editor will be notified as new submissions arrive. The Editor will collect these submissions and assign them to subject area specialists.

Electronically prepared manuscripts. Manuscripts should be electronically prepared in $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$. To this end, the Society has prepared $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ author packages for each AMS publication. Author packages include instructions for preparing electronic manuscripts, the *AMS Author Handbook*, samples, and a style file that generates the particular design specifications of that publication series. Articles properly prepared using the $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ 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 the *Bulletin of the AMS* from www.ams.org/bull/bullauthorpac.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. Authors should indicate if the paper has been prepared using $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{T}\mathcal{E}\mathcal{X}$ or $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{T}\mathcal{E}\mathcal{X}$. 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.

The final file of an accepted article should also be sent by email to both bulletin@math.uic.edu and susan@math.northwestern.edu.

Electronic graphics. Comprehensive instructions on preparing graphics are available 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 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%.

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 may be sent to bull-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 bull-query@ams.org or directly to the Electronic Prepress Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2213 USA.

BULLETIN OF THE AMERICAN MATHEMATICAL SOCIETY

CONTENTS

Vol. 57, No. 4

October 2020

ARTICLES

- Charles Fefferman, Alex Ionescu, Terence Tao, and Stephen Wainger, with contributions from Loredana Lanzani, Akos Magyar, Mariusz Mirek, Alexander Nagel, D. H. Phong, Lillian Pierce, Fulvio Ricci, Christopher Sogge, and Brian Street,** Analysis and applications: The mathematical work of Elias Stein 523
- Charles M. Newman and Wei Wu,** Constants of de Bruijn–Newman type in analytic number theory and statistical physics 595
- Rohan Karthikeyan, Siddharth Sinha, and Vallabh Patil,** On the resolution of the sensitivity conjecture 615

MATHEMATICAL PERSPECTIVES

- Charlie Fefferman,** About the cover: Tribute to Elias Stein 639
- Selected Mathematical Reviews 641

BOOK REVIEWS

- Richard Montgomery** (Reviewer), A comprehensive introduction to sub-Riemannian geometry. From the Hamiltonian viewpoint, by Andrei Agrachev, Davide Barilari, and Ugo Boscain 657
- John E. McCarthy** (Reviewer), Loewner’s theorem on monotone matrix functions, by Barry Simon 679



0273-0979(202010)57;4*:1-M

