



### TABLE OF CONTENTS

---

•	<b>Description</b>	<b>p.1</b>
•	<b>Audience</b>	<b>p.1</b>
•	<b>Impact Factor</b>	<b>p.2</b>
•	<b>Abstracting and Indexing</b>	<b>p.2</b>
•	<b>Editorial Board</b>	<b>p.2</b>
•	<b>Guide for Authors</b>	<b>p.6</b>



ISSN: 0022-247X

### DESCRIPTION

---

The *Journal of Mathematical Analysis and Applications* presents papers that treat **mathematical analysis** and its numerous applications. The journal emphasizes articles devoted to the mathematical treatment of questions arising in physics, chemistry, biology, and engineering, particularly those that stress analytical aspects and novel problems and their solutions.

Papers are sought which employ one or more of the following areas of classical analysis:

- **Analytic number theory**
- **Functional analysis** and **operator theory**
- **Real** and **harmonic analysis**
- **Complex analysis**
- **Numerical analysis**
- **Applied mathematics**
- **Partial differential equations**
- **Dynamical systems**
- **Control** and **Optimization**
- **Probability**
- **Mathematical biology**
- **Combinatorics**
- **Mathematical physics**

Prospective authors are strongly encouraged to read the [Guide for Authors](#).

This journal has an [Open Archive](#). All published items, including research articles, have unrestricted access and will remain permanently free to read and download 48 months after publication. All papers in the Archive are subject to [Elsevier's user license](#).

### AUDIENCE

---

Pure mathematicians, applied mathematicians, numerical analysts

## IMPACT FACTOR

---

2016: 1.064 © Thomson Reuters Journal Citation Reports 2017

## ABSTRACTING AND INDEXING

---

BioEngineering Abstracts  
Current Contents/Physics, Chemical, & Earth Sciences  
Mathematical Reviews  
Engineering Index  
Research Alert  
Science Abstracts  
Science Citation Index  
Zentralblatt MATH  
CompuMath Citation Index  
Scopus

## EDITORIAL BOARD

---

### *Editors-in-Chief:*

**Richard M. Aron**, Kent State University, Kent, Ohio, USA

Functional analysis, Infinite-dimensional function theory. Fax: 330 672 2209

**Goong Chen**, Texas A&M University, College Station, Texas, USA

Applied and computational PDE's, Vibration control, nonlinear and chaotic systems, Engineering mechanics, molecular quantum mechanics and quantum computing. Fax: 979 862 4190.

**Steven G. Krantz**, Washington University in St. Louis, St. Louis, Missouri, USA

Real and complex analysis, Partial differential equations. Fax: 314 935 6839

### *Honorary Editors:*

**George Leitmann**

**William F. Ames †**

**James S.W. Wong**

### *Division Editors*

**David Ambrose**, Drexel University, Philadelphia, Pennsylvania, USA

Partial differential equations and fluid dynamics

**Raúl Curto**, University of Iowa, Iowa City, Iowa, USA

Single and multivariable operator theory C-algebras; Classical theory of moments

**Hélène Frankowska**, Université Pierre et Marie Curie, Sorbonne Universités, Paris, France

Control and Optimization; Hamilton-Jacobi equations; Set-Valued and Variational Analysis; Viability Theory; Differential Games

**Juan Nieto**, Universidade de Santiago de Compostela, Santiago de Compostela, Spain

Nonlinear Differential Equations; Biomedical Applications

**Paul Sacks**, Iowa State University, Ames, Iowa, USA

Differential equations

**Ulrich Stadtmüller**, Universität Ulm, Ulm, Germany

**Rodolfo Torres**, University of Kansas, Lawrence, Kansas, USA

Fourier analysis

### *Associate Editors*

**V. Andrievskii**, Kent State University, Kent, Ohio, USA

Approximation theory; Potential theory

**J.A. Ball**, Virginia Polytechnic Institute & State University, Blacksburg, Virginia, USA

Operator and control theory

**J. Bastero**, Universidad de Zaragoza, Zaragoza, Spain

Asymptotic geometric analysis; Geometry of Banach spaces; Function spaces

**B.C. Berndt**, University of Illinois at Urbana-Champaign, Urbana, USA

Analytic number theory; Classical analysis; Special functions

**D. Blecher**, University of Houston, Houston, Texas, USA

Functional analysis; Operator theory; Operator algebras

**G. Bluman**, University of British Columbia, Vancouver, British Columbia, Canada

Differential equations

**J. Bonet**, Universitat Politècnica de València, Valencia, Spain

Functional analysis; Operator theory

**B. Bongiorno**, Università degli Studi di Palermo, Palermo, Italy

Real analysis

**M.J. Carro**, Universitat de Barcelona, Barcelona, Spain

Real analysis; Harmonic analysis

**B. Cascales**, Universidad de Murcia, Murcia, Spain

Measure and integration; Functional analysis

**A. Cianchi**, Università degli Studi di Firenze, Firenze, Italy

Function spaces; Partial differential equations

**C. Clason**, Universität Duisburg-Essen, Essen, Germany

Inverse problems, non-smooth and PDE-constrained optimization, and biomedical imaging

**P.L. Combettes**, North Carolina State University, Raleigh, North Carolina, USA

Convex optimization; Inverse problems; Nonlinear functional analysis

**S. Cooper**, Massey University, Auckland, New Zealand

Analytic number theory; Special functions

**G. Corach**, Instituto Argentino de Matematica, Buenos Aires, Argentina

Functional analysis; Operator theory; Harmonic analysis

**M. Csornyei**, University of Chicago, Chicago, Illinois, USA

Real analysis, geometric measure theory, and geometric nonlinear functional analysis

**Z. Cuckovic**, University of Toledo, Toledo, Ohio, USA

Complex analysis in one and several variables and Operator theory

**A. Daniilidis**, Universitat Autònoma de Barcelona (UAB), Bellaterra, Spain

Variational analysis; Optimization

**M. del Pino**, Universidad de Chile, Santiago, Chile

Concentration phenomena in nonlinear elliptic equations; Blow-up and asymptotic behavior in nonlinear parabolic equations

**T. Domínguez Benavides**, Universidad de Sevilla, Sevilla, Spain

Nonlinear function analysis

**K. Driver**, University of Cape Town, Rondebosch, South Africa

Special functions (including trigonometric functions); Approximations and expansions

**Y. Du**, University of New England, Armidale, New South Wales, Australia

Nonlinear elliptic and parabolic equations; Nonlinear analysis

**R. G. Durán**, Universidad de Buenos Aires, Buenos Aires, Argentina

Finite element methods; Harmonic analysis

**S. Eilers**, University of Copenhagen, Copenhagen O, Denmark

Selfadjoint operator algebras, Symbolic dynamics, K-theory and operator algebras, Enumerative combinatorics

**P. Exner**, Czech Academy of Sciences, Rez, Czech Republic

Spectral and scattering theory of differential operators

**L.A. Fialkow**, State University of New York (SUNY) at New Paltz, New Paltz, New York, USA

Functions of a complex variable; Integral transforms; Oational calculus; Operator theory

**J.A. Filar**, University of Queensland, Brisbane, Australia

Optimization; Operations research; Markov decision processes; Game theory; Singular perturbations; Application

**S.A. Fulling**, Texas A&M University, College Station, Texas, USA

Theoretical physics; Spectral and asymptotic theory of differential operators

**S. Geiss**, University of Jyväskylä, Finland

Stochastic Analysis, Interpolation theory, Backward Stochastic Differential Equations, Probability in Banach Spaces

**R. Gornet**, University of Texas at Arlington, Arlington, Texas, USA

Spectral geometry

**J.L. Guermond**, Texas A&M University, College Station, TX, USA

Fluid mechanics, Partial differential equations, Numerical analysis

**C. Gutierrez**, Temple University, Philadelphia, Pennsylvania, USA

Partial differential equations; Harmonic analysis

**Y. Huang**, Zhongshan University, Guangzhou, China

Dynamical systems; Chaos; Control theory

**A.V. Isaev**, Australian National University, Canberra, Australian Capital Territory, Australia

Complex analysis and geometry

**K. Jarosz**, Southern Illinois University at Carbondale, Edwardsville, Illinois, USA

Functional analysis, Spaces of analytic functions of a single variable

**H. K. Jenssen**, Penn State University, Pennsylvania, USA  
 Partial Differential Equations, Hyperbolic Conservation Laws, Compressible Flow

**A. Jentzen**, Eidgenössische Technische Hochschule (ETH) Zürich, Zürich, Switzerland  
 Stochastic ordinary differential equations; Stochastic partial differential equations

**H. Kang**, Inha University, Incheon, The Republic of Korea  
 Inverse problems; Partial differential equations

**D. Khavinson**, University of South Florida, Tampa, Florida, USA  
 Classical analysis

**P. Koskela**, University of Jyväskylä, Jyväskylä, Finland  
 Quasiconformal mappings; Sobolev spaces; Analysis on metric spaces

**M. Laczko**, Eötvös Loránd Tudományegyetem (ELTE), V. Kerület, Budapest, Hungary  
 Real functions; Measure theory

**W.J. Layton**, University of Pittsburgh, Pittsburgh, Pennsylvania, USA  
 Differential equations; Fluid mechanics; Turbulence

**P.G. Lemarie-Rieusset**, Université d'Evry-Val-d'Essonne, Evry, France  
 Harmonic analysis; Nonlinear PDEs; Wavelets

**J. Lenells**, KTH Royal Institute of Technology, Stockholm, Sweden  
 Nonlinear Dispersive Waves; PDEs; Integrable Systems

**H. Lin**, University of Oregon, Eugene, Oregon, USA  
 Operator Algebras

**H. Liu**, Iowa State University, Ames, Iowa, USA  
 Hyperbolic partial differential equations; Numerical analysis

**A. Lunardi**, Università degli Studi di Parma, Parma, Italy  
 Elliptic and parabolic partial differential equations; Abstract evolution equations

**M. Mathieu**, Queen's University Belfast, Belfast, UK  
 Functional analysis; Operator theory

**A. Mazzucato**, Penn State University, Pennsylvania, USA  
 Partial Differential Equations; Fluid Mechanics and Elasticity; Harmonic Analysis; Inverse Problems.

**L. Molnar**, University of Szeged, Szeged, Hungary and Budapest University of Technology and Economics, Budapest, Hungary  
 Functional analysis; Operator theory

**M. Musso**, Pontificia Universidad Católica de Chile, Santiago, Chile  
 Concentration Phenomena in Nonlinear Elliptic Equations; Blow-up Phenomena in Nonlinear Parabolic Equations

**P. Nevai**, Upper Arlington (Columbus), Ohio, USA  
 Approximation theory; Orthogonal polynomials

**H.R. Parks**, Oregon State University, Corvallis, Oregon, USA  
 Geometric analysis; Calculus of variations

**M.M. Peloso**, Università degli Studi di Milano, Milano, Italy  
 Harmonic analysis; Several complex variables

**R. Popovych**  
 Ordinary differential equations; Partial differential equations

**V. Pozdnyakov**, University of Connecticut, Storrs, Connecticut, USA  
 Probability theory; Mathematical statistics

**M. Quincampoix**, Université de Bretagne Occidentale, Brest, France  
 Deterministic and stochastic control; Differential equations and inclusions; Nonsmooth optimization; Differential games

**V. Radulescu**, Romanian Academy, Bucharest, Romania  
 Nonlinear elliptic partial differential equations; Critical point theory; Nonlinear analysis; Variational and hemivariational inequalities

**T. Ransford**, Université Laval, Quebec City, Quebec, Canada  
 Complex analysis; Potential theory; Operator theory

**D. Repovš**, University of Ljubljana, Ljubljana, Slovenia  
 Topological methods in nonlinear analysis, Applications of functional analysis, Set-valued analysis

**E. Saksman**, University of Helsinki, Helsinki, Finland  
 Functions of a complex variable; Partial differential equations; Fourier analysis; Stochastic processes; Operator theory

**M. Schlosser**, University of Vienna, Wien, Austria  
 Special functions; Difference and functional equations

**J. Shi**, College of William and Mary, Williamsburg, Virginia, USA  
 Partial differential equations; Nonlinear analysis; Mathematical biology

**R. Stelzer**, Universität Ulm, Ulm, Germany

Probability theory and stochastic processes; Statistics; Game theory, economics, social and behavioral sciences

**E.J. Straube**, Texas A&M University, College Station, Texas, USA

Several complex variables

**A. Sulem**, INRIA-Rocquencourt, Le Chesnay cedex, France

Stochastic control; Financial mathematics

**S.-M. Sun**, Virginia Tech, Blacksburg, Virginia, USA

Water wave problems, PDE theory for the equation derived from water wave problems

**S. Tikhonov**, ICREA, Barcelona, Spain

Approximation theory; Fourier analysis

**R.M. Timoney**, Trinity College, Dublin 2, Ireland

Several complex variables and analytic spaces; Functional analysis

**Y. Tong**, City University of Hong Kong, Hong Kong, China

Partial differential equations, fluid and gas dynamics; kinetic equations

**D. Wang**, University of Pittsburgh, Pittsburgh, Pennsylvania, USA

Partial differential equations

**C.E. Wayne**, Boston University, Boston, Massachusetts, USA

Dynamical systems; Partial differential equations

**W.L. Wendland**, Universität Stuttgart, Stuttgart, Germany

Integral equations; Partial differential equations; Numerical analysis

**M. Winkler**, Universität Paderborn, Paderborn, Germany

Parabolic PDEs, Formation of Singularities

**J.D.M. Wright**, University of Aberdeen, Aberdeen, UK

Measure theory; Operator algebras

**J. Xiao**, Memorial University of Newfoundland, St. John's, Newfoundland and Labrador, Canada

Partial differential equations; Harmonic and complex analysis

**Y. Yamada**, Waseda University, Shinjuku-Ku, Tokyo, Japan

Parabolic PDEs, Population Biology

**P.F. Yao**, Chinese Academy of Sciences (CAS), Beijing, China

Partial differential equations; Systems and control; Nonlinear elasticity

**H.-M. Yin**, Washington State University, Pullman, Washington, USA

Partial differential equations and applications; Financial engineering and portfolio management;

Electromagnetic fields

**N. Young**, Leeds University and Newcastle University, UK

Mathematical analysis, particularly operators on Hilbert space; complex analysis; H infinity control

**X. Zhang**, Sichuan University, Chengdu, China

Control theory; Partial differential equations; Stochastic analysis

**H.J. Zwart**, University of Twente, Enschede, Netherlands

Systems and control theory

**Founding Editor:**

**Richard Bellman** †

**Publisher**

**Simone Munao**, Elsevier BV, Amsterdam, Netherlands

## GUIDE FOR AUTHORS

---

### INTRODUCTION

The *Journal of Mathematical Analysis and Applications* will publish carefully selected mathematical papers treating classical analysis and its manifold applications. Papers devoted to the mathematical treatment of questions arising in physical, biological, and social sciences and engineering will be considered, particularly those in which analytical aspects and the novelty of the solution of a nontrivial application are emphasized.

### Submission Limitations

Due to publishing constraints, only two submissions per author per year will be considered, at the discretion of the Editors-in-Chief. Cognate papers by the same author will not be published in the same issue; such series of papers will be considered only with the understanding that, if accepted, they will not appear in the same issue.

### Contact details for submission

Authors may suggest an associate editor appropriate for the paper; however, assignment to that associate editor is not assured. Consult the list of associate editors and their specializations on the journal webpage or on a print copy of the journal.

### Submission checklist

You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

### Ensure that the following items are present:

One author has been designated as the corresponding author with contact details:

- E-mail address
- Full postal address

All necessary files have been uploaded:

*Manuscript:*

- Include keywords
- All figures (include relevant captions)
- All tables (including titles, description, footnotes)
- Ensure all figure and table citations in the text match the files provided
- Indicate clearly if color should be used for any figures in print

*Graphical Abstracts / Highlights files* (where applicable)

*Supplemental files* (where applicable)

Further considerations

- Manuscript has been 'spell checked' and 'grammar checked'
- All references mentioned in the Reference List are cited in the text, and vice versa
- Permission has been obtained for use of copyrighted material from other sources (including the Internet)
- A competing interests statement is provided, even if the authors have no competing interests to declare
- Journal policies detailed in this guide have been reviewed
- Referee suggestions and contact details provided, based on journal requirements

For further information, visit our [Support Center](#).

### BEFORE YOU BEGIN

#### *Ethics in publishing*

Please see our information pages on [Ethics in publishing](#) and [Ethical guidelines for journal publication](#).

#### *Declaration of interest*

All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work. Examples of potential conflicts of interest include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding. Authors must disclose any interests in two places: 1. A

summary declaration of interest statement in the title page file (if double-blind) or the manuscript file (if single-blind). If there are no interests to declare then please state this: 'Declarations of interest: none'. This summary statement will be ultimately published if the article is accepted. 2. Detailed disclosures as part of a separate Declaration of Interest form, which forms part of the journal's official records. It is important for potential interests to be declared in both places and that the information matches. [More information](#).

### **Submission declaration and verification**

Submission of an article implies that the work described has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis or as an electronic preprint, see '[Multiple, redundant or concurrent publication](#)' section of our ethics policy for more information), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify originality, your article may be checked by the originality detection service [CrossCheck](#).

### **Authorship**

All authors should have made substantial contributions to all of the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.

### **Changes to authorship**

Authors are expected to consider carefully the list and order of authors **before** submitting their manuscript and provide the definitive list of authors at the time of the original submission. Any addition, deletion or rearrangement of author names in the authorship list should be made only **before** the manuscript has been accepted and only if approved by the journal Editor. To request such a change, the Editor must receive the following from the **corresponding author**: (a) the reason for the change in author list and (b) written confirmation (e-mail, letter) from all authors that they agree with the addition, removal or rearrangement. In the case of addition or removal of authors, this includes confirmation from the author being added or removed.

Only in exceptional circumstances will the Editor consider the addition, deletion or rearrangement of authors **after** the manuscript has been accepted. While the Editor considers the request, publication of the manuscript will be suspended. If the manuscript has already been published in an online issue, any requests approved by the Editor will result in a corrigendum.

### **Copyright**

Upon acceptance of an article, authors will be asked to complete a 'Journal Publishing Agreement' (see [more information](#) on this). An e-mail will be sent to the corresponding author confirming receipt of the manuscript together with a 'Journal Publishing Agreement' form or a link to the online version of this agreement.

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. [Permission](#) of the Publisher is required for resale or distribution outside the institution and for all other derivative works, including compilations and translations. If excerpts from other copyrighted works are included, the author(s) must obtain written permission from the copyright owners and credit the source(s) in the article. Elsevier has [preprinted forms](#) for use by authors in these cases.

For open access articles: Upon acceptance of an article, authors will be asked to complete an 'Exclusive License Agreement' ([more information](#)). Permitted third party reuse of open access articles is determined by the author's choice of [user license](#).

### **Author rights**

As an author you (or your employer or institution) have certain rights to reuse your work. [More information](#).

#### *Elsevier supports responsible sharing*

Find out how you can [share your research](#) published in Elsevier journals.

## **Role of the funding source**

You are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s), if any, in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. If the funding source(s) had no such involvement then this should be stated.

### *Funding body agreements and policies*

Elsevier has established a number of agreements with funding bodies which allow authors to comply with their funder's open access policies. Some funding bodies will reimburse the author for the Open Access Publication Fee. Details of [existing agreements](#) are available online.

## **Open access**

This journal offers authors a choice in publishing their research:

### **Subscription**

- Articles are made available to subscribers as well as developing countries and patient groups through our [universal access programs](#).
- No open access publication fee payable by authors.

### **Open access**

- Articles are freely available to both subscribers and the wider public with permitted reuse.
- An open access publication fee is payable by authors or on their behalf, e.g. by their research funder or institution.

Regardless of how you choose to publish your article, the journal will apply the same peer review criteria and acceptance standards.

For open access articles, permitted third party (re)use is defined by the following [Creative Commons user licenses](#):

#### *Creative Commons Attribution (CC BY)*

Lets others distribute and copy the article, create extracts, abstracts, and other revised versions, adaptations or derivative works of or from an article (such as a translation), include in a collective work (such as an anthology), text or data mine the article, even for commercial purposes, as long as they credit the author(s), do not represent the author as endorsing their adaptation of the article, and do not modify the article in such a way as to damage the author's honor or reputation.

#### *Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND)*

For non-commercial purposes, lets others distribute and copy the article, and to include in a collective work (such as an anthology), as long as they credit the author(s) and provided they do not alter or modify the article.

The open access publication fee for this journal is **USD 1500**, excluding taxes. Learn more about Elsevier's pricing policy: <http://www.elsevier.com/openaccesspricing>.

### *Green open access*

Authors can share their research in a variety of different ways and Elsevier has a number of green open access options available. We recommend authors see our [green open access page](#) for further information. Authors can also self-archive their manuscripts immediately and enable public access from their institution's repository after an embargo period. This is the version that has been accepted for publication and which typically includes author-incorporated changes suggested during submission, peer review and in editor-author communications. Embargo period: For subscription articles, an appropriate amount of time is needed for journals to deliver value to subscribing customers before an article becomes freely available to the public. This is the embargo period and it begins from the date the article is formally published online in its final and fully citable form. [Find out more](#).

This journal has an embargo period of 24 months.

### *Elsevier Publishing Campus*

The Elsevier Publishing Campus ([www.publishingcampus.com](http://www.publishingcampus.com)) is an online platform offering free lectures, interactive training and professional advice to support you in publishing your research. The College of Skills training offers modules on how to prepare, write and structure your article and explains how editors will look at your paper when it is submitted for publication. Use these resources, and more, to ensure that your submission will be the best that you can make it.



### *Language (usage and editing services)*

Please write your text in good English (American or British usage is accepted, but not a mixture of these). Authors who feel their English language manuscript may require editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English may wish to use the [English Language Editing service](#) available from Elsevier's WebShop.

### **Submission**

Our online submission system guides you stepwise through the process of entering your article details and uploading your files. The system converts your article files to a single PDF file used in the peer-review process. Editable files (e.g., Word, LaTeX) are required to typeset your article for final publication. All correspondence, including notification of the Editor's decision and requests for revision, is sent by e-mail.

## **PREPARATION**

### **Peer review**

This journal operates a single blind review process. All contributions will be initially assessed by the editor for suitability for the journal. Papers deemed suitable are then typically sent to a minimum of one independent expert reviewer to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final. [More information on types of peer review.](#)

### *LaTeX*

You are recommended to use the Elsevier article class [elsarticle.cls](#) to prepare your manuscript and [BibTeX](#) to generate your bibliography.

Our [LaTeX site](#) has detailed submission instructions, templates and other information.

### **Article structure**

#### *Subdivision - numbered sections*

Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to 'the text'. Any subsection may be given a brief heading. Each heading should appear on its own separate line.

#### *Introduction*

State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

#### *Theory/calculation*

A Theory section should extend, not repeat, the background to the article already dealt with in the Introduction and lay the foundation for further work. In contrast, a Calculation section represents a practical development from a theoretical basis.

#### *Discussion*

This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

#### *Conclusions*

The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

#### *Glossary*

Please supply, as a separate list, the definitions of field-specific terms used in your article.

### **Essential title page information**

- **Title.** Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.
- **Author names and affiliations.** Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.

• **Corresponding author.** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and Materials. **Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.**

• **Present/permanent address.** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

### **Abstract**

A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

### *Highlights*

Highlights are a short collection of bullet points that convey the core findings of the article. Highlights are optional and should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point). You can view [example Highlights](#) on our information site.

### **Keywords**

Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

### *Abbreviations*

Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

### *Acknowledgements*

Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

### *Formatting of funding sources*

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, please include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

### *Math formulae*

Please submit math equations as editable text and not as images. Present simple formulae in line with normal text where possible and use the solidus (/) instead of a horizontal line for small fractional terms, e.g., X/Y. In principle, variables are to be presented in italics. Powers of e are often more conveniently denoted by exp. Number consecutively any equations that have to be displayed separately from the text (if referred to explicitly in the text).

## Footnotes

Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors can build footnotes into the text, and this feature may be used. Otherwise, please indicate the position of footnotes in the text and list the footnotes themselves separately at the end of the article. Do not include footnotes in the Reference list.

## Artwork

### Electronic artwork

#### General points

- Make sure you use uniform lettering and sizing of your original artwork.
- Embed the used fonts if the application provides that option.
- Aim to use the following fonts in your illustrations: Arial, Courier, Times New Roman, Symbol, or use fonts that look similar.
- Number the illustrations according to their sequence in the text.
- Use a logical naming convention for your artwork files.
- Provide captions to illustrations separately.
- Size the illustrations close to the desired dimensions of the published version.
- Submit each illustration as a separate file.

A detailed [guide on electronic artwork](#) is available.

**You are urged to visit this site; some excerpts from the detailed information are given here.**

#### Formats

If your electronic artwork is created in a Microsoft Office application (Word, PowerPoint, Excel) then please supply 'as is' in the native document format.

Regardless of the application used other than Microsoft Office, when your electronic artwork is finalized, please 'Save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):

EPS (or PDF): Vector drawings, embed all used fonts.

TIFF (or JPEG): Color or grayscale photographs (halftones), keep to a minimum of 300 dpi.

TIFF (or JPEG): Bitmapped (pure black & white pixels) line drawings, keep to a minimum of 1000 dpi.

TIFF (or JPEG): Combinations bitmapped line/half-tone (color or grayscale), keep to a minimum of 500 dpi.

#### Please do not:

- Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); these typically have a low number of pixels and limited set of colors;
- Supply files that are too low in resolution;
- Submit graphics that are disproportionately large for the content.

#### Color artwork

Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF), or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites) regardless of whether or not these illustrations are reproduced in color in the printed version. **For color reproduction in print, you will receive information regarding the costs from Elsevier after receipt of your accepted article.** Please indicate your preference for color: in print or online only. [Further information on the preparation of electronic artwork.](#)

#### Figure captions

Ensure that each illustration has a caption. Supply captions separately, not attached to the figure. A caption should comprise a brief title (**not** on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

## Tables

Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules and shading in table cells.

## References

### *Citation in text*

Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

### *Reference links*

Increased discoverability of research and high quality peer review are ensured by online links to the sources cited. In order to allow us to create links to abstracting and indexing services, such as Scopus, CrossRef and PubMed, please ensure that data provided in the references are correct. Please note that incorrect surnames, journal/book titles, publication year and pagination may prevent link creation. When copying references, please be careful as they may already contain errors. Use of the DOI is encouraged.

A DOI can be used to cite and link to electronic articles where an article is in-press and full citation details are not yet known, but the article is available online. A DOI is guaranteed never to change, so you can use it as a permanent link to any electronic article. An example of a citation using DOI for an article not yet in an issue is: VanDecar J.C., Russo R.M., James D.E., Ambeh W.B., Franke M. (2003). Aseismic continuation of the Lesser Antilles slab beneath northeastern Venezuela. *Journal of Geophysical Research*, <https://doi.org/10.1029/2001JB000884>. Please note the format of such citations should be in the same style as all other references in the paper.

### *Web references*

As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

### *Data references*

This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

### *References in a special issue*

Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

### *Reference management software*

Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support [Citation Style Language styles](#), such as [Mendeley](#) and [Zotero](#), as well as [EndNote](#). Using the word processor plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal's style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide.

### *Reference formatting*

There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct. If you do wish to format the references yourself they should be arranged according to the following examples:

### *Reference style*

*Text:* Indicate references by number(s) in square brackets in line with the text. The actual authors can be referred to, but the reference number(s) must always be given.

Example: '..... as demonstrated [3,6]. Barnaby and Jones [8] obtained a different result ....'

*List:* The list of references is arranged alphabetically and then numbered (numbers in square brackets).

*Examples:*

Reference to a journal publication:

[1] J. van der Geer, J.A.J. Hanraads, R.A. Lupton, The art of writing a scientific article, *J. Sci. Commun.* 163 (2010) 51–59.

Reference to a book:

[2] W. Strunk Jr., E.B. White, *The Elements of Style*, fourth ed., Longman, New York, 2000.

Reference to a chapter in an edited book:

[3] G.R. Mettam, L.B. Adams, How to prepare an electronic version of your article, in: B.S. Jones, R.Z. Smith (Eds.), *Introduction to the Electronic Age*, E-Publishing Inc., New York, 2009, pp. 281–304.

*Journal abbreviations source*

Journal names should be abbreviated according to the [List of Title Word Abbreviations](#).

## **Video**

Elsevier accepts video material and animation sequences to support and enhance your scientific research. Authors who have video or animation files that they wish to submit with their article are strongly encouraged to include links to these within the body of the article. This can be done in the same way as a figure or table by referring to the video or animation content and noting in the body text where it should be placed. All submitted files should be properly labeled so that they directly relate to the video file's content. . In order to ensure that your video or animation material is directly usable, please provide the file in one of our recommended file formats with a preferred maximum size of 150 MB per file, 1 GB in total. Video and animation files supplied will be published online in the electronic version of your article in Elsevier Web products, including [ScienceDirect](#). Please supply 'stills' with your files: you can choose any frame from the video or animation or make a separate image. These will be used instead of standard icons and will personalize the link to your video data. For more detailed instructions please visit our [video instruction pages](#). Note: since video and animation cannot be embedded in the print version of the journal, please provide text for both the electronic and the print version for the portions of the article that refer to this content.

## **Supplementary material**

Supplementary material such as applications, images and sound clips, can be published with your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version. Please switch off the 'Track Changes' option in Microsoft Office files as these will appear in the published version.

## **AudioSlides**

The journal encourages authors to create an AudioSlides presentation with their published article. AudioSlides are brief, webinar-style presentations that are shown next to the online article on ScienceDirect. This gives authors the opportunity to summarize their research in their own words and to help readers understand what the paper is about. [More information and examples are available](#). Authors of this journal will automatically receive an invitation e-mail to create an AudioSlides presentation after acceptance of their paper.

## **Interactive plots**

This journal enables you to show an Interactive Plot with your article by simply submitting a data file. [Full instructions](#).

## **AFTER ACCEPTANCE**

### **Proofs**

One set of page proofs (as PDF files) will be sent by e-mail to the corresponding author (if we do not have an e-mail address then paper proofs will be sent by post) or, a link will be provided in the e-mail so that authors can download the files themselves. Elsevier now provides authors with PDF proofs which can be annotated; for this you will need to [download the free Adobe Reader](#), version 9 (or higher). Instructions on how to annotate PDF files will accompany the proofs (also given online). The exact system requirements are given at the [Adobe site](#).

If you do not wish to use the PDF annotations function, you may list the corrections (including replies to the Query Form) and return them to Elsevier in an e-mail. Please list your corrections quoting line number. If, for any reason, this is not possible, then mark the corrections and any other comments (including replies to the Query Form) on a printout of your proof and scan the pages and return via e-mail. Please use this proof only for checking the typesetting, editing, completeness and correctness of the text, tables and figures. Significant changes to the article as accepted for publication will only be considered at this stage with permission from the Editor. We will do everything possible to get your article published quickly and accurately. It is important to ensure that all corrections are sent back to us in one communication: please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely your responsibility.

### **Offprints**

The corresponding author will, at no cost, receive a customized [Share Link](#) providing 50 days free access to the final published version of the article on [ScienceDirect](#). The Share Link can be used for sharing the article via any communication channel, including email and social media. For an extra charge, paper offprints can be ordered via the offprint order form which is sent once the article is accepted for publication. Both corresponding and co-authors may order offprints at any time via Elsevier's [Webshop](#). Corresponding authors who have published their article open access do not receive a Share Link as their final published version of the article is available open access on ScienceDirect and can be shared through the article DOI link.

### **AUTHOR INQUIRIES**

Visit the [Elsevier Support Center](#) to find the answers you need. Here you will find everything from Frequently Asked Questions to ways to get in touch.

You can also [check the status of your submitted article](#) or find out [when your accepted article will be published](#).

© Copyright 2014 Elsevier | <http://www.elsevier.com>