Knowledge as a commons:
How to improve the peer review
and dissemination of research outputs

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Knowledge as a commons

Ideas are not of the same nature as material products
since when you give an idea, you do not lose it.
Therefore knowledge is not a product to be traded,
but a commons to be shared since
its exchange is a positive-sum game.

Charlotte Hess and Elinor Ostrom,
Understanding knowledge as a Commons,
MIT Press, 2006

Elinor Ostrom received in 2009 the Nobel prize
in economic sciences, together with Oliver Williamson, for :
'her analysis of economic gouvernance, especially the commons
showing how common resources can be managed successfully
by the people who use them rather than
by governments or private companies'.

Elinor Ostrom (1933-2012)

She was professor of political science
at Indiana University (USA)
and the only woman
who has ever received the
Nobel prize in economic sciences.

What research is about?

Research is a collaborative endeavour,
in both space and time, that advances through
discussions, seminars, conferences and peer-reviewed articles.

Publishing means making the research outputs
publicly available for their evaluation and use.

Peer reviewing means checking the content of articles by peers,
i.e., researchers in activity (not employees of the publishers),
able to find errors and to assess originality of the results.

$\Longrightarrow$

This guarantees
the validation, reproduction, transmission and conservation
of the research outputs for the advancement of knowledge.

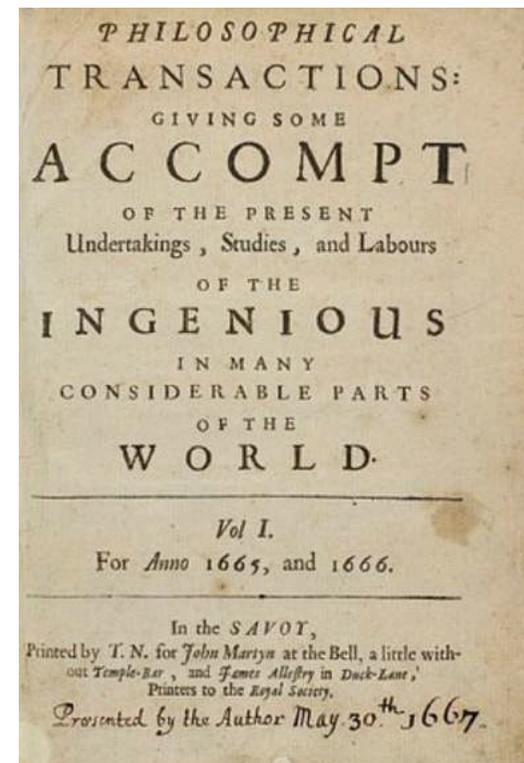# Peer-reviewed scholarly journals

The publication of research outputs in peer-reviewed journals
is the backbone of the present research system.
It was founded on *January 5th 1665* for sharing ideas and results.
It is also used today for evaluating researchers and projects.
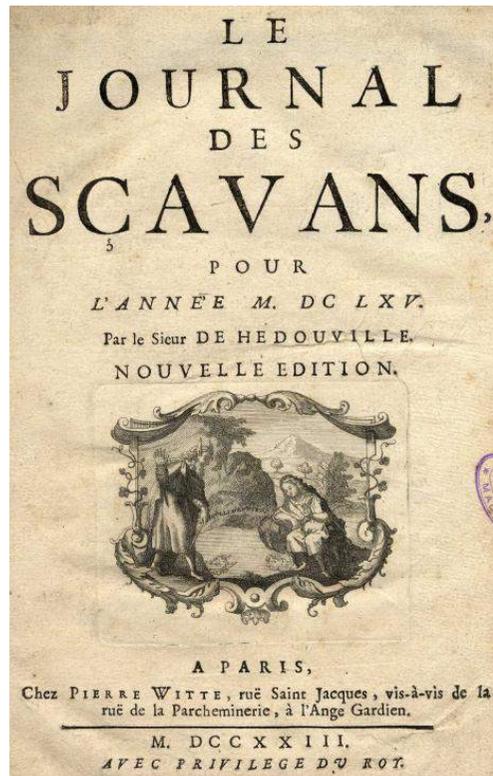
Paris, 5th January 1665

London, 6th March 1665

How is the
scholarly publishing system
today?

Business model of peer-reviewed journals

Researchers acting as editors

Researchers write articles, typeset them in final format, review those of their peers, are editors of scholarly journals.

Taxpayers

Publishers

After papers are accepted by reviewers and editors, publishers put them online, insure their visibility, occasionally print them, and sell them.
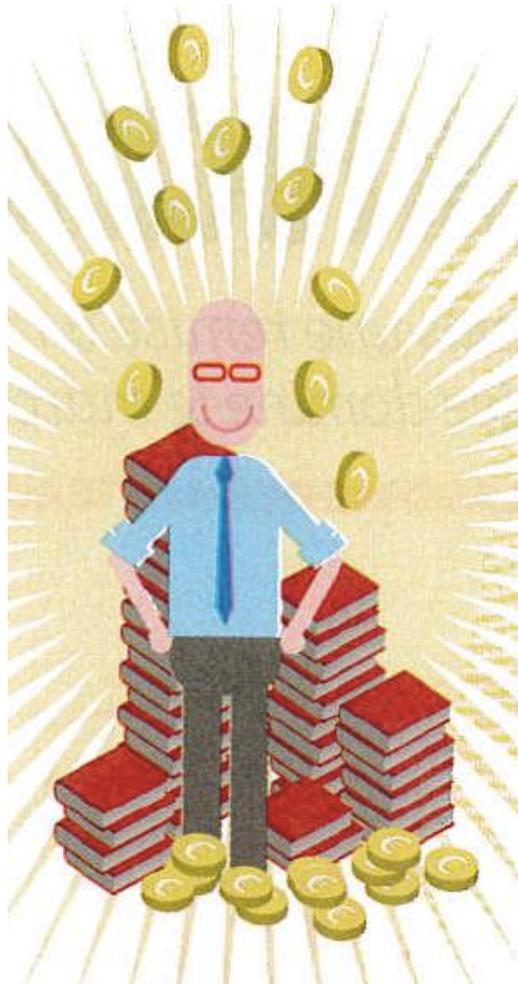
Their salaries are paid by taxpayers

Librarians negociate subscription contracts, pay them, control access to the journals and curate collections of articles.

Publishers own articles, journals and more…

*Profit margin
up to 40% !*

Before publishing the accepted papers,
publishers require that researchers
transfer them their copyrights for free!

⟹

Publishers own intellectual property of
the text, figures and data contained in articles
for more than 100 years. They can thus
sell articles at the prices and conditions
they set, with non-disclosable contracts.

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peer-reviewing and publishing plaftforms,
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Article DOI:	10.1080/14685248.2017.1284326
Author(s):	Teluo Sakurai, Katsunori Yoshimatsu, Kai Schneider, Marie Farge, Koji Morishita, Takashi Ishihara
To publish in the Journal:	Journal of Turbulence
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Who has access to peer-reviewed articles ?

Only researchers working in institutions and countries rich enough to afford the very costly subscriptions to scholarly journals.

Researchers working for companies, or in poor institutions, teachers, students, retired researchers, and all citizens who finance public research do not have access to most of the scholarly articles.

By 2000 most of the famous scholarly journals have been bought by few major publishers, whose exceptional profits rely on the work that researchers and their funding agencies offer them for free.

Publishers want to benefit from the digital revolution and the Web to develop online publishing and reduce their production costs, while preserving their business model designed for printing.

$\Longrightarrow$

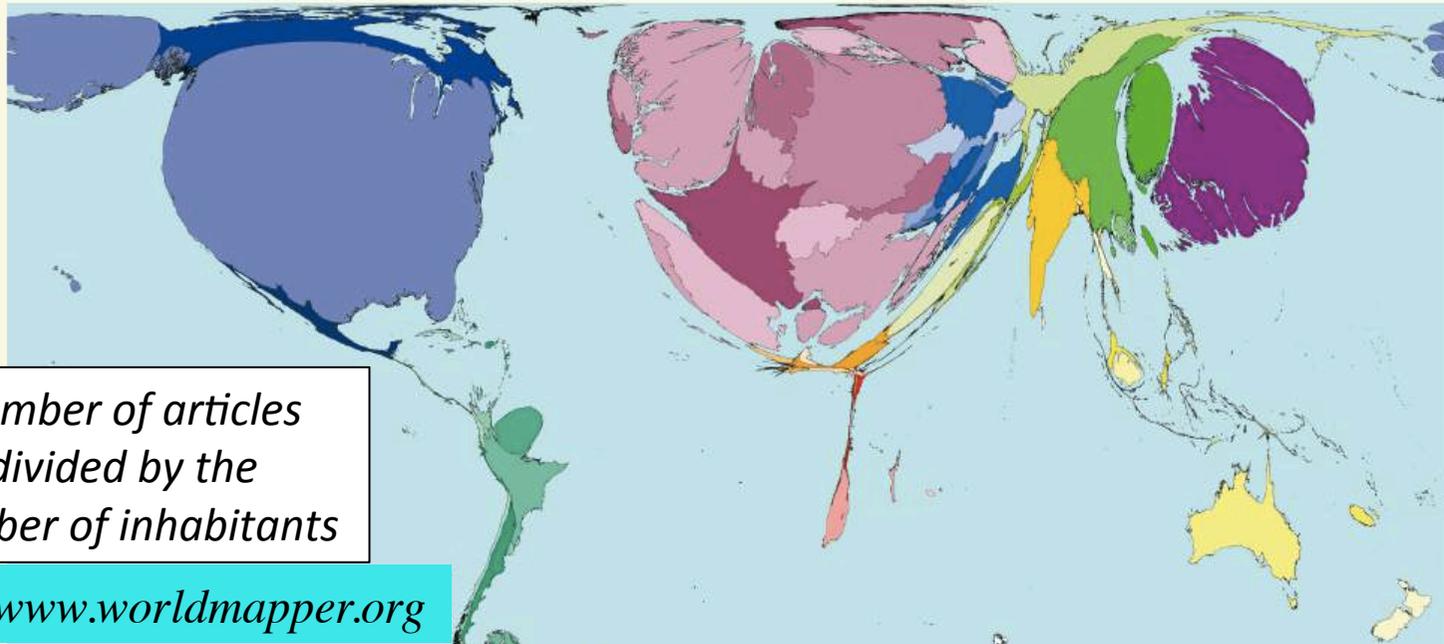Today few major publishers have acquired an oligopolistic position.

Operating profits and profit margin of the publisher *Reed-Elsevier*
for its Scientific, Technical and Medical (STM) division from 1990 to 2015
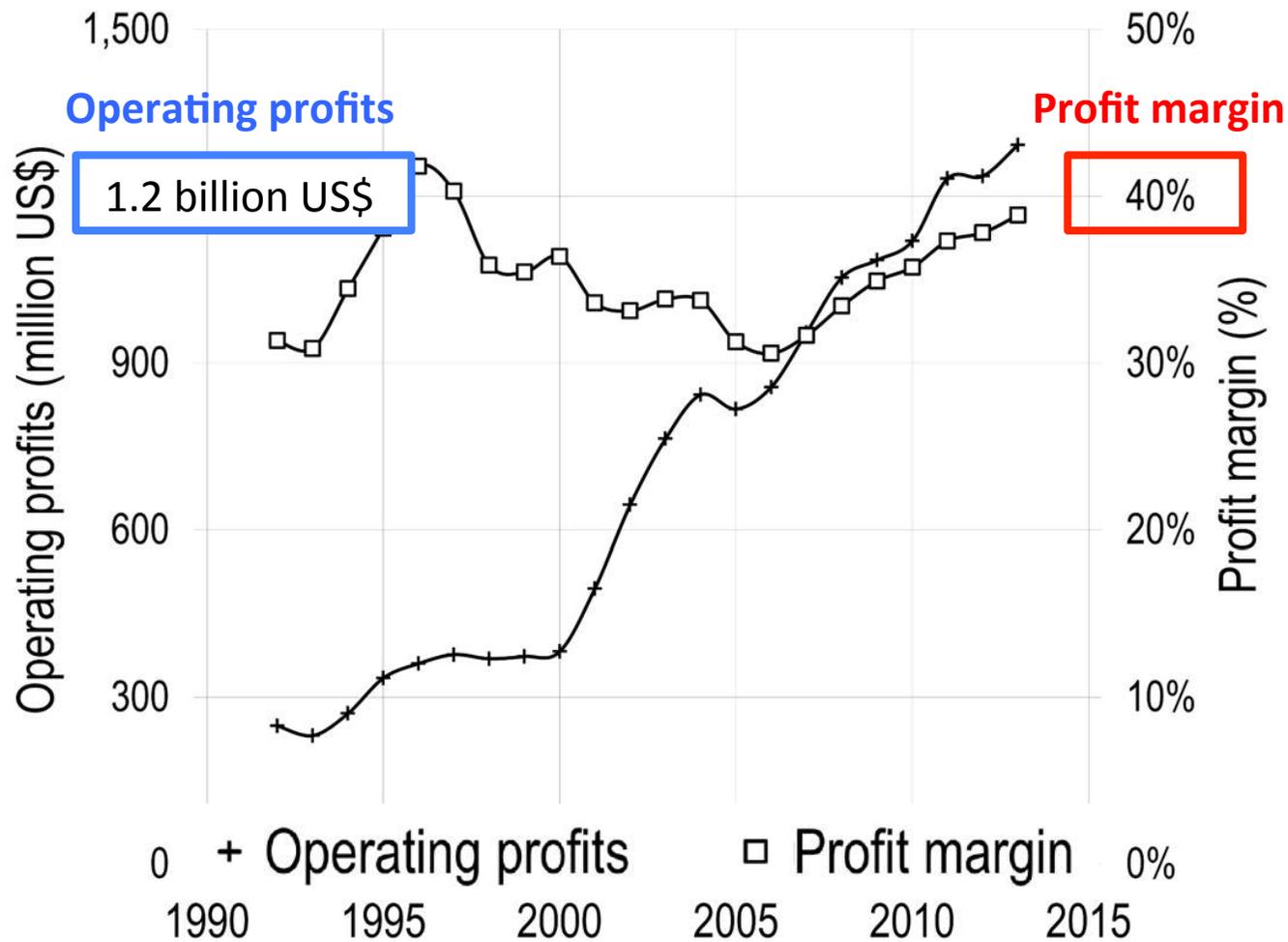
Vincent Larivière et al., The Oligopoly of Academic Publishers, PLOS one, 10th June 2015

Density of peer-reviewed articles per country

Number of articles
divided by the
number of inhabitants

http://www.worldmapper.org

1 →	1 →	1 →	Centre National de la Recherche Scientifique*
2 →	1 →	1 →	Chinese Academy of Sciences*
3 →	1 →	1 →	Russian Academy of Sciences*
4 →	1 →	1 →	Harvard University
5 →	2 →	1 →	Helmholtz Gemeinschaft*
6 →	3 →	2 →	Max Planck Gesellschaft*
7 →	2 →	1 →	University of Tokyo

http://www.scimagoir.com

Today publishers impose their
Gold Open Access model,
which flips subscription costs
into article processing charges that
researchers have to pay to publish

⟹

researchers might get bankrupted
or stop publishing!

How could be the scholarly publishing system tomorrow?

What do we need publishers for ?

'Since the creation of scientific journals 350 years ago, large commercial publishing houses have increased their control of the science system. While one could argue that their role of typesetting, printing, and diffusion were central in the print world, the ease with which these functions can be fulfilled in the electronic world makes one wonder: what do we need publishers for? […] It is up to the scientific community to change the system in a similar fashion and in parallel to the open access and open science movements. Unfortunately, researchers are still dependent on one essentially symbolic function of publishers, which is to allocate academic capital, thereby explaining why the scientific community is so dependent on *The Most Profitable Obsolete Technology in History* '

The marginal cost of online publishing is 0

'While, in economic terms, printed journals can be considered as rival goods— goods that cannot be owned simultaneously by two individuals— online journals are non-rival goods : a single journal issue that has been uploaded by the publisher on the journal's website can be accessed by many researchers from many universities at the same time. The publisher does not have to upload or produce an additional copy each time a paper is accessed on the server as it can be duplicated *ad infinitum*, which in turn reduces the marginal cost of additional subscriptions to 0. In a system where the marginal cost of goods reaches 0, their cost becomes arbitrary and depends merely on how badly they are needed, as well as by the purchasing power of those who need them. [...] In such a system, any price is good for the seller, as the additional unit sold is pure profit.'

The Cost of Knowledge, 2012

Tim Gowers and 33 mathematician colleagues called to boycott *Elsevier* and thus stopped the *Research Works Act*, a bill to the US Congress *Elsevier* was lobbying for.

Sir Tim Gowers
Fields medal 1998

16556 Researchers Taking a Stand. See the list

Academics have protested against Elsevier's business practices for years with little effect. These are some of their objections:

1. They charge exorbitantly high prices for subscriptions to individual journals.

2. In the light of these high prices, the only realistic option for many libraries is to agree to buy very large "bundles", which will include many journals that those libraries do not actually want. Elsevier thus makes huge profits by exploiting the fact that some of their journals are essential.

3. They support measures such as SOPA, PIPA and the ~~Research Works Act~~, that aim to restrict the free exchange of information.

http://www.thecostofknowledge.com/

Researchers want to recover control !

`Neither author nor reader should have to pay to publish and a
journal should not belong to its publisher but to its editorial board.
The dissemination of the peer-reviewed articles should be done using
public infrastructures, from where articles should be accessible for free.'

Marie Farge, Note for the French Minister of Research, June 29th 2012
http://openscience.ens.fr/MARIE_FARGE/

Researchers proposed
an alternative model :
Diamond Open Access

Diamond Sutra,
the earliest complete survival
of a dated printed book,
China, 11th May 868

British Library, London

The Diamond Open Access model

1

Authors keep their copyright and make
their articles available in open access
with a Creative Commons license CC-BY.

https://creativecommons.org/licenses/

2

The editorial board owns the journal (title and assets), while
the editors and referees peer-review the articles for free,
as before since this is part as their academic duty.

3

The publisher is no more the journal's owner but
becomes a service provider, that the editorial board
selects and hires by contract.

Two Diamond Open Access journals

1

IPOL Journal · Image Processing On Line

Founded in 2010 by Jean-Michel Morel, IPOL has 41 editors.
It is financed by CNES, ERC and 13 public institutions from 5 countries.
Each article contains the text, the algorithm and the source code,
which all are peer reviewed. The journal platform also provides
online demonstration facility and an archive of experiments.
IPOL thus ensures open science and reproducible research.

2

Discrete Analysis
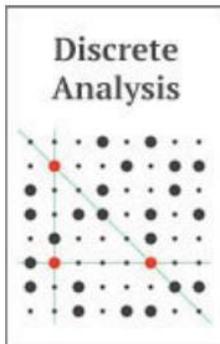
Founded in 2015 by Tim Gowers, DA has 12 editors.
It is an overlay journal on the open repository arXiv.
It is financed by Cambridge University (10$/submission).

We need public publishing platforms

Public funding agencies should provide for free to researchers
publicly-owned platforms developed in open source software,
for peer-reviewing, publishing and archiving peer-reviewed articles,
with the help of librarians and of publishers (as subcontractors).

Anyone from anywhere would have free (gratis and libre) access to
any peer-reviewed publication (*e.g.*, articles, data, codes, videos)
without researchers having to pay to publish their results.

Funding agencies would thus control the quality of peer-reviewing,
by selecting the journals having good practices and reputable editors,
that will then be published for free.

Such publishing platforms would give the chance to researchers
to experiment new ways of publishing (*e.g.*, open peer-reviewing).

Two public publishing platforms

Brasil
+
África do Sul
Argentina
Brasil
Chile
Colômbia
Costa Rica
Cuba
Espanha
México
Peru
Portugal
Venezuela
+
Bolívia
Paraguai
Uruguai

SciELO
Scientific Electronic Library Online

Created in 1999,
it publishes
1249 journals
in open access,
financed by public
agencies from Brazil
(FAPESP, CNPq,
BIREME) and from
15 other countries.

revues.org
CENTRE POUR L'ÉDITION ÉLECTRONIQUE OUVERTE
CENTRE FOR OPEN ELECTRONIC PUBLISHING

Created in 1999,
it publishes
451 journals
in open access,
financed by public
agencies from France
(CNRS, EHESS, BSN,
Aix-Marseille and
Avignon universities).

How to insure a smooth transition from printing on paper towards online publishing?

Green Open Access is the wisest model !

Today publishers own scientific journals and control bibliometry,
that they use as a marketing tool to insure their control.

The Gold Open Access model leads to the creation
of predatory journals of very poor quality, even fake journals.
To avoid this and to guarantee a smooth transition towards open access,
researchers would like to preserve the main traditional journals
which are useful, having a good reputation and good practices.

$$\Longrightarrow$$

> The wisest solution is the Green Open Access model, *i.e.*,

researchers should keep the academic freedom to publish
their articles in the journals they prefer, and at the same time
deposit a version in a public open repository.

http://openscience.ens.fr/MARIE_FARGE

Dissemin to boost Green Open Access

Antonin Delpeuch, a student in computer sciences from ENS Paris,
created in September 2014 the plateform ***http://dissem.in***,
that is collectively developed in open source.

'Spot your own paywalled papers.
Liberate them in one click!'

The team *CAPSH / Dissemin*

http://dissem.in is supported by the not-for-profit association CAPSH (Committee for the Accessibility of Publications in Sciences and Humanities) created on *September 5th 2015* by :

Antonin Delpeuch
Graduate student, Computer Science
École Normale Supérieure
France

Creator and main developer of the platform *Dissemin*

"We need to take a stand against more traditional publishers"

SPARC Europe

Europe's Open Access Champion 2016

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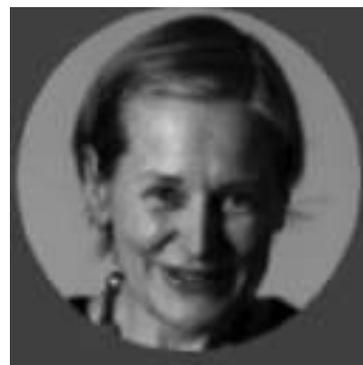
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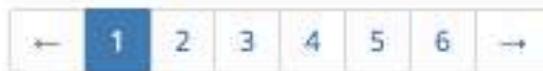
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Seung-Bu Park, Pierre Gentine, Kai Schneider, **Marie Farge**

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2015

Marie Farge, Kai Schneider

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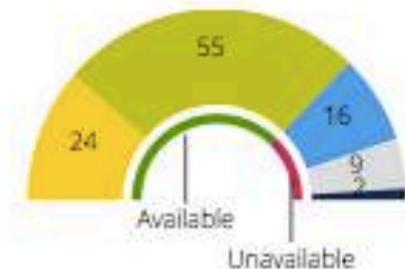⬇ Download | Cambridge University Press (CUP), Journal of Plasma Physics, 06(81), 2015.

Researcher

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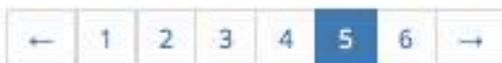
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Coherent vortex extraction in three-dimensional homogeneous turbulence: Comparison between CVS-wavelet and POD-Fourier decompositions

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Kai Schneider, **Marie Farge**

Coherent Vortex Simulation (CVS) of 2D bluff body flows using an adaptive wavelet method with penalisation

⬆ Upload | Springer Verlag, Notes on Numerical Fluid Mechanics and Multidisciplinary Design, 2003.

Bartosz Protas, Kai Schneider, **Marie Farge**

2002

Geometrical alignment properties in Fourier- and wavelet-filtered statistically stationary two-dimensional turbulence

⬆ Upload | Physical Review E, **4**(66), 2002.

Kai Schneider, **Marie Farge**

Adaptive Wavelet Simulation of a Flow around an Impulsively Started Cylinder Using Penalisation

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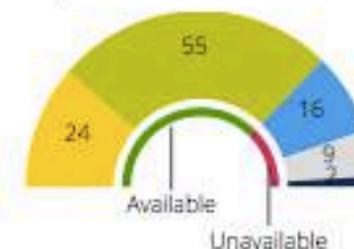
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Coherent vortex extraction in three-dimensional homogeneous turbulence: Comparison between CVS-wavelet and POD-Fourier decompositions

Journal article by Marie Farge, Kai Schneider, Giulio Pellegrino, Alan A. Wray, Robert S. Rogallo

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Abstract

The coherent vortex simulation (CVS) decomposes each realization of a turbulent flow into two orthogonal components: An organized coherent flow and a random incoherent flow. They both contribute to all scales in the inertial range, but exhibit different statistical behaviors. The CVS decomposition is based on the nonlinear filtering of the vorticity field, projected onto an orthonormal wavelet basis made of compactly supported functions, and the computation of the induced velocity field using Biot–Savart's relation. We apply it to a three-dimensional homogeneous isotropic turbulent flow with a Taylor microscale Reynolds number $R_\lambda =168$, computed by direct numerical simulation at resolution $N=256^3$. Only 2.9%N wavelet modes correspond to the coherent flow made of vortex tubes, which contribute 99% of energy and 79% of enstrophy, and exhibit the same $k^{-5/3}$ energy spectrum as the total flow. The remaining 97.1%N wavelet modes correspond to a incoherent random flow which is structureless, has an equipartition energy spectrum, and a Gaussian velocity probability distribution function (PDF). For the same flow and the same compression rate, the proper orthogonal decomposition (POD), which in this statistically homogeneous case degenerates into the Fourier basis, decomposes each flow realization into large scale and small scale flows, in a way similar to large eddy simulation(LES) filtering. It is shown that the large scale flow thus obtained does not extract the vortex tubes equally well as the coherent flow resulting from the CVS decomposition. Moreover, the small scale flow still contains coherent structures, and its velocity PDF is stretched exponential, while the incoherent flow is structureless, decorrelated, and its velocity PDF is Gaussian. Thus, modeling the effect of the incoherent flow discarded by CVS-wavelet shall be easier than modeling the effect of the small scale flow discarded by POD-Fourier or LES.

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Abstract

The coherent vortex simulation (CVS) decomposes each realization of a turbulent flow into two orthogonal components: An organized coherent flow and a random incoherent flow. They both contribute to all scales in the inertial range, but exhibit different statistical behaviors. The CVS decomposition is based on the nonlinear filtering of the vorticity field, projected onto an orthonormal wavelet basis made of compactly supported functions, and the computation of the induced velocity field using Biot–Savart's relation. We apply it to a three-dimensional homogeneous isotropic turbulent flow with a Taylor microscale Reynolds number $R_\lambda = 168$, computed by direct numerical simulation at resolution $N=256^3$. Only 2.9%N wavelet modes correspond to the coherent flow made of vortex tubes, which contribute 99% of energy and 79% of enstrophy, and exhibit the same $k^{-5/3}$ energy spectrum as the total flow. The remaining 97.1%N wavelet modes correspond to a incoherent random flow which is structureless, has an equipartition energy spectrum, and a Gaussian velocity probability distribution function (PDF). For the same flow and the same compression rate, the proper orthogonal decomposition (POD), which in this statistically homogeneous case degenerates into the Fourier basis, decomposes each flow realization into large scale and small scale flows, in a way similar to large eddy simulation(LES) filtering. It is shown that the large scale flow thus obtained does not extract the vortex tubes equally well as the coherent flow resulting from the CVS decomposition. Moreover, the small scale flow still contains coherent structures, and its velocity PDF is stretched exponential, while the incoherent flow is structureless, decorrelated, and its velocity PDF is Gaussian. Thus, modeling the effect of the incoherent flow discarded by CVS-wavelet shall be easier than modeling the effect of the small scale flow discarded by POD-Fourier or LES.

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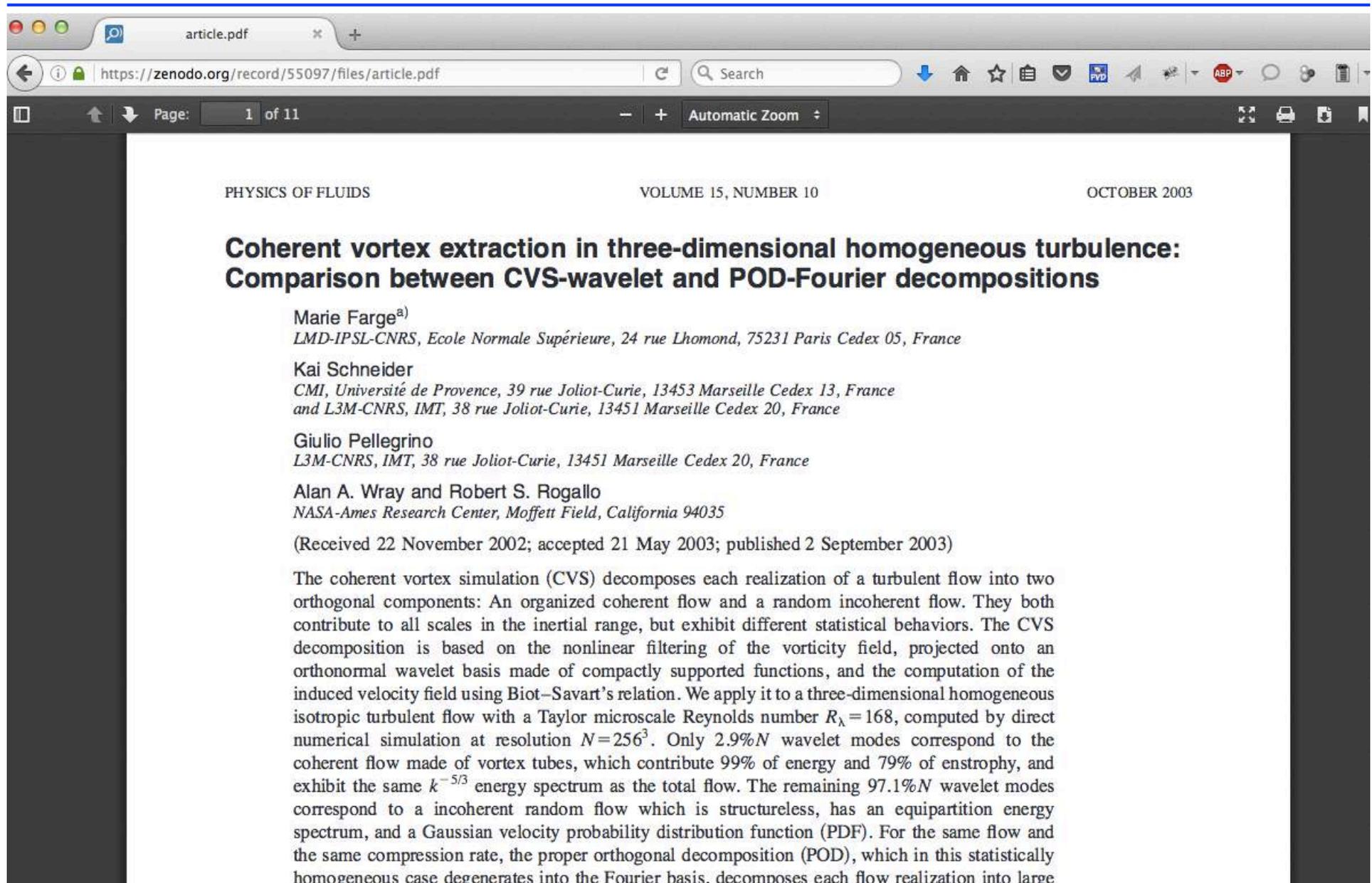
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Coherent vortex extraction in three-dimensional homogeneous turbulence: Comparison between CVS-wavelet and POD-Fourier decompositions

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The coherent vortex simulation (CVS) decomposes each realization of a turbulent flow into two orthogonal components: An organized coherent flow and a random incoherent flow. They both contribute to all scales in the inertial range, but exhibit different statistical behaviors. The CVS decomposition is based on the nonlinear filtering of the vorticity field, projected onto an orthonormal wavelet basis made of compactly supported functions, and the computation of the induced velocity field using Biot–Savart's relation. We apply it to a three-dimensional homogeneous isotropic turbulent flow with a Taylor microscale Reynolds number $R_\lambda = 168$, computed by direct numerical simulation at resolution $N = 256^3$. Only $2.9\%N$ wavelet modes correspond to the coherent flow made of vortex tubes, which contribute 99% of energy and 79% of enstrophy, and exhibit the same $k^{-5/3}$ energy spectrum as the total flow. The remaining $97.1\%N$ wavelet modes correspond to a incoherent random flow which is structureless, has an equipartition energy spectrum, and a Gaussian velocity probability distribution function (PDF). For the same flow and the same compression rate, the proper orthogonal decomposition (POD), which in this statistically homogeneous case degenerates into the Fourier basis, decomposes each flow realization into large
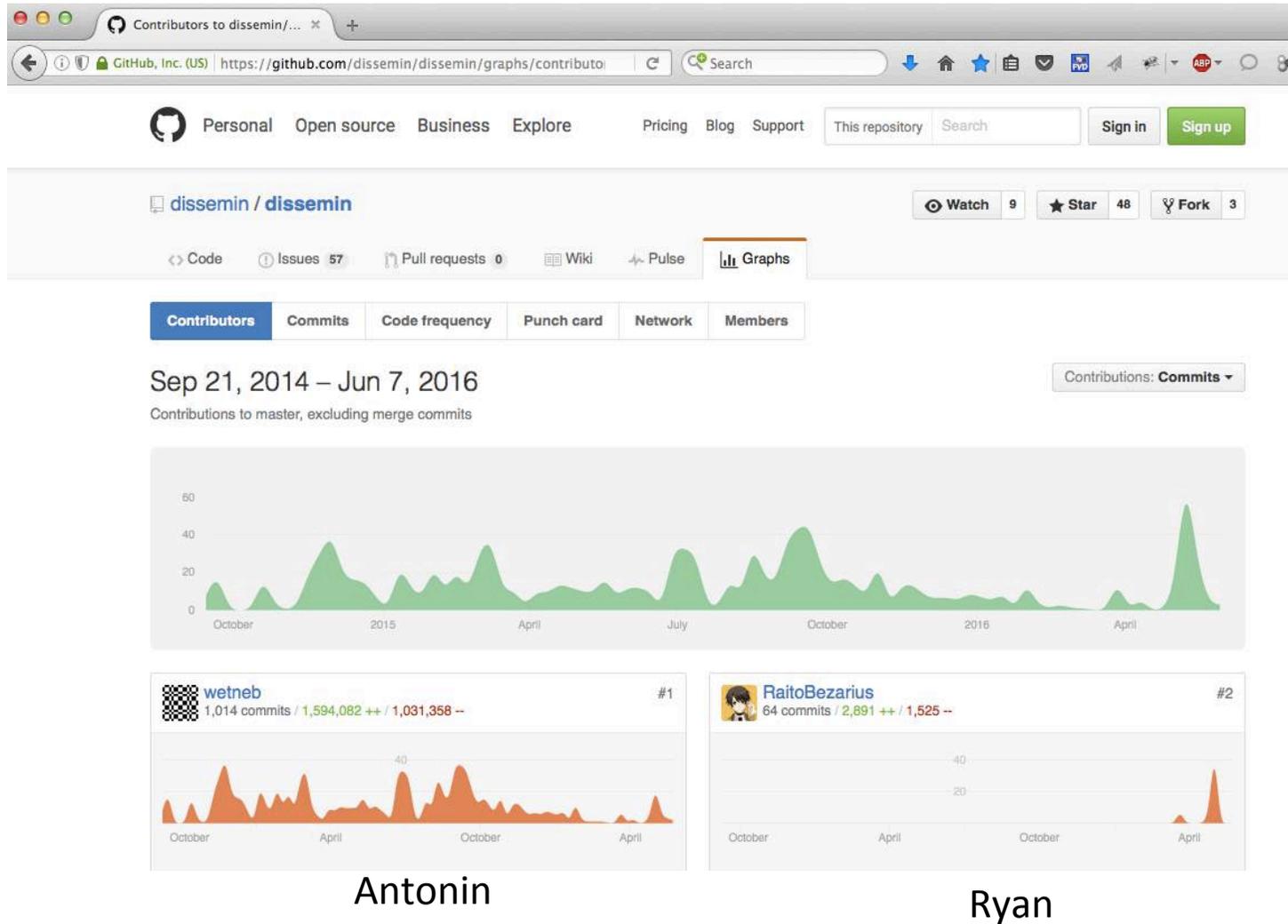
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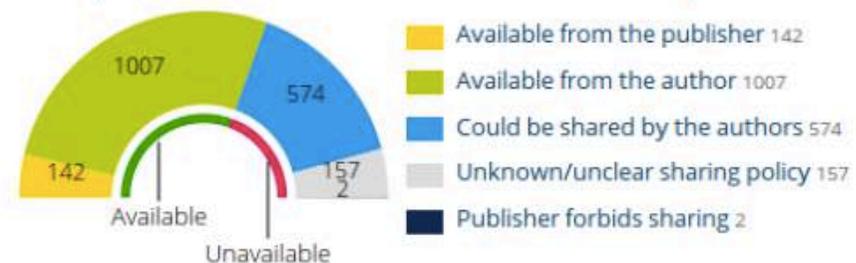
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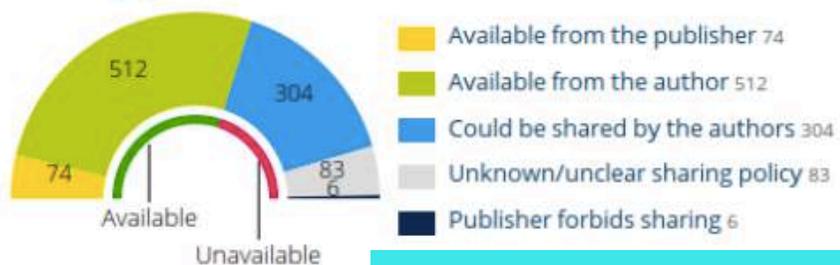
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Conclusion

Today investments for producing and peer-reviewing articles are public but ownership of journals, peer-reviewing reports and publishing platforms and profits from subscriptions, article processing charges and bibliometric data are private.

Publishers should become service providers to publicly funded and publicly owned publishing platforms, without having anymore the property of articles and journals, plus platforms for peer-reviewing, publishing, bibliometry and related data.

$\Longrightarrow$
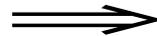
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'Scholarly publishing and peer-reviewing in open access', Marie Farge, 2017
in 'Europe's Future: Open Science, Open Innovation, and Open to the World',
European Commission, DG Research, Science and Innovation, April 2017

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