



These things take time: the first 1000 volumes of the Journal of Fluid Mechanics

Colm-cille P. Caulfield^{†,*}

Department of Applied Mathematics and Theoretical Physics, Centre for Mathematical Sciences, Cambridge, CB3 0WA, UK

With this landmark issue, towards the end of 2024, the Journal of Fluid Mechanics has now published one thousand volumes, reporting many exciting original research results in fluid mechanics for nearly 70 years since its founding in 1956 by George Batchelor. The journal, commonly (and I trust affectionately) known as ‘*JFM*’ to the international research community, has of course grown significantly over the years just as that community has grown and the world of academic publishing has changed beyond recognition. In terms of bald numbers illustrating that growth, the first volume in 1956 had 39 articles, spread over 8 months and 6 parts. Nowadays, over 1000 papers are published every year, available online as soon as they are ready, yet formally allocated to 24 volumes each year, each two week period thus typically having more *JFM* papers published than in the eight months spanned by the first volume.

As the journal volume number ticks into four figures, it seemed appropriate to aim to mark this significant occasion in three ways: through remembering the history; through highlighting some of the innovations in publishing that *JFM* has embraced in order to stay at the forefront of the dissemination of fluid mechanical research; and, undoubtedly most importantly, through demonstrating the lasting significance, value and impact of the research published in *JFM*, not only for all of us as academics, but also for broader society. I am delighted that past and present members of the Editorial Board of *JFM* have contributed special articles and editorials to this volume to achieve these three aims.

History

First, it is always important to remember (and learn from) history, and the shoulders of the giants on which we stand. I am indebted to former editors Keith Moffatt and Tim Pedley for providing their memories of the foundation and early years of *JFM*, particularly paying tribute to the visionary and inspirational leadership of George Batchelor, while also acknowledging the inevitable teething problems of any new endeavour, especially in the academic world. On reading their editorial reminiscences, I am struck by three particular aspects of Batchelor’s vision that resonate down the years.

[†] Email address for correspondence: cpc12@cam.ac.uk

* Professor C.P. Caulfield is the Editor of *Journal of Fluid Mechanics* from 2022.

First, Batchelor was clearly committed to the very highest standards of excellence: in the quality, significance and originality of the science presented; in the quality of the presentation and exposition itself, through excellent figures, excellent writing and excellent production values; and in the quality, rigour and integrity of the review process. We are very fortunate as a research community that that commitment to excellence in science, in academic publishing (supported admirably by Cambridge University Press) and in the peer review process (supported by us all as reviewers as well as authors) still survives and thrives at *JFM*. The present Editorial Board is committed to maintaining the exacting standards for which *JFM* is justly renowned in the years ahead, so that we can all trust that a paper published in *JFM* is of high quality, and tells us (clearly. . .) something interesting, significant and important about fluid mechanics.

Second, Batchelor was committed to the international nature of research, insisting from the very beginning that *JFM* had different nationalities and research communities represented on the Editorial Board. That commitment remains true, and if anything is even stronger today, and I believe it is a great strength of *JFM* that it acts as a forum for the whole international research community to report and disseminate the very best work.

Third, as quoted by Keith from Batchelor's 1981 'Preoccupations' editorial, *JFM* was expressly created to bring together all those interested in fluid mechanics. *JFM* has never acknowledged an artificial compartmentalisation into 'theoretical and mathematical', 'experimental and observational' (we might now add 'numerical') and 'application' research, but rather welcomes all such research contributions that provide new and significant fluid mechanical insight. This foundational philosophical belief in the inherent value of inclusivity and diversity could be argued to be ahead of its time, but nevertheless it has proved a real strength of *JFM*, and I believe has contributed greatly to the manifest success and value of fluid mechanical research since *JFM* was founded.

Publishing innovation

It should go without saying that publishing *JFM* has changed markedly since its early days, not least by having a very positive partnership with CUP, unlike the apparently somewhat rocky initial relationship with Taylor & Francis. Papers have certainly become longer on average, while conventions of authorship have changed so that multiple authorship is much more common. There also has been an undoubted increase in the number of citations. As editors, we are very vigilant to ensure that references are only made when there is a good reason to do so, and deplore the perverse incentives of various 'metrics' that (misleadingly) avoid the critical (and difficult) task of actually determining inherent quality and value of research contributions.

However, as discussed by my predecessor as Editor (in Chief) M. Grae Worster in his editorial, the process of finding pre-existing research has been completely transformed by the internet revolution, and so there is a natural tendency for the number of papers consulted by article authors to be increased markedly. Like Grae, I too remember laborious physical searches of libraries for pre-existing literature. (I actually tracked down perhaps the most crucial paper for my PhD studies, unfortunately not published in *JFM*, in a cupboard below an undergraduate laboratory bench in the Cavendish Laboratory, home to Cambridge's Physics Department.) Nowadays, in seconds, my students can 'Google' and download papers associated with appropriate keywords without leaving their desk, a purely positive advance, although they will never experience the excitement of going to the library and thumbing through the latest (physical) volume of *JFM* to see 'what's going on.'

JFM has embraced the opportunities provided by this revolution in a variety of ways. Every *JFM* article in all 1000 volumes is now just a click away, and we are embracing the concept of open access, while ensuring that the highest peer review and editorial standards remain. As described by Paul Linden (former Deputy Editor) in his editorial, *JFM* has introduced a range of different articles, building on the gold standard of ‘standard’ papers that continue to provide the perfect venue for the reporting and description of the very best fluid mechanical research. Complementing ‘standard’ articles, the *Perspectives* articles (<https://www.cambridge.org/core/journals/journal-of-fluid-mechanics/jfm-perspectives>) that he discusses have proved to be an exceptionally valuable addition to *JFM*. These critical surveys of the state of the art of some field of fluid mechanics have an extended format that allows the invited authors to provide an accessible, but still authoritative overview to their research field, designed to allow the interested reader to ‘get up to speed’ with what really matters.

We have also introduced *Rapids* articles (<https://www.cambridge.org/core/journals/journal-of-fluid-mechanics/jfm-rapids>), relatively short, yet still self-contained, articles which report exciting results that are likely to have a high impact on some aspect of currently active fluid dynamical research. At the instigation of my colleague, Deputy Editor Charles Meneveau, it is also now possible to submit a *JFM Notebook* (<https://www.cambridge.org/core/journals/journal-of-fluid-mechanics/jfm-notebooks>), interactive objects that execute code (via cloud-based Python notebooks) and visualise data (in ways other than the figures of record within the published papers). These notebooks increase the transparency and accessibility of the research published in *JFM*, and reflect our commitment to openness and clarity in reporting and highlighting research into fluid mechanical phenomena of all kinds.

Indeed, our commitment to highlighting the essence, complexity and beauty of fluid mechanical phenomena is perhaps best demonstrated by the *Focus on Fluids* (*FoF*) initiative (<https://www.cambridge.org/core/journals/journal-of-fluid-mechanics/focus-on-fluids>). At the invitation of Grae, I was honoured to launch this initiative in 2009. Each month, the *FoF* Associate Editor invites an acknowledged expert to highlight one particularly interesting recent article published in *JFM*. Taken as a whole, this collection of short articles (ably edited by my successors as *FoF* Associate Editor, Anne Juel and Jerome Neufeld) have explained the context, importance and implications of the underlying papers to a wider audience, and have served a very valuable purpose to demonstrate and communicate immediately to our community just a few of the exciting, significant research results being reported in *JFM*.

Lasting impact and significance

Although highlighting new interesting research on publication is welcome, by far the most important and valuable contribution of *JFM* to the international research community is publishing really significant and important research results, that influence, underpin and guide subsequent research for years to come: that ‘stand the test of time.’ Every fluid mechanics researcher will have (at least!) one story to tell of a key *JFM* paper from years gone by that they are certain continues to be essential reading for anyone working in a particular research field, and that continues to motivate subsequent research by teams all over the world.

To give some small illustration of this lasting impact, I have invited 10 past and present colleagues from *JFM*’s Editorial Board to write special *FoF* articles (<https://www.cambridge.org/core/journals/journal-of-fluid-mechanics/jfm-volume1000>). Each editor was given a specific century of volumes, from which they had to select just one paper

to discuss. Focusing in this way on papers published throughout the nearly 70-year history of the journal, these 10 *FoF* articles, published in this 1000th volume, admirably show just how significant and central *JFM* has been to the development and evolution of fluid mechanical research in all its beautiful variety. (Special thanks are due to Jerome for his careful and dedicated editorial coordination of these articles.) I hope that the community finds these special *FoF* articles as interesting and inspiring to read as I have.

They beautifully demonstrate the broadening and deepening of the research topics considered by our community over the years, and the broadening and diversification of our community. Nevertheless, they clearly demonstrate fidelity to Batchelor's original vision of the value of publishing papers for an international community with 'interest in fluid mechanics as a whole.' These articles reinforce his central argument that advancing the understanding of fluid mechanics is best achieved by appropriately combining mathematical theory, physical intuition gained from experiment, observation (and simulation!). The articles admirably show that fundamental insight is the best way to transform application of that fluid mechanical understanding across science and technology, in both long-standing and newly emergent areas.

In closing, I also hope that just over 40 years from now, one of my successors can similarly highlight the central importance of papers from the second thousand volumes of *JFM* to the evolution and development of fluid mechanics throughout the 21st century. I am confident that the papers in the first thousand volumes will still be providing the most solid of fluid foundations to our community.

Author ORCID.

 Colm-cille P. Caulfield <https://orcid.org/0000-0002-3170-9480>.