Journal of Fluid Mechanics: notation and style guide

By L. J. DRATH

Department of Applied Mathematics and Theoretical Physics,
Silver Street, Cambridge CB3 9EW, UK
e-mail: jfm@damtp.cam.ac.uk

(Received 24 July 2001)

1. Introduction

This document describes *Journal of Fluid Mechanics* house style and notation, i.e. editorial guidance on the content of the paper. It is intended to complement the Input Guide to the *JFM* LaTeX style file, and so does not include general matters of layout and numbering which the style file handles automatically, or information on using LaTeX, which can be found in the Input Guide or the LaTeX Manual.

Most editorial queries concerning notation and house style can be answered by looking at recent pages in the *Journal*. The more important points are noted in the following sections, and further information and examples can be found in the Input Guide (JFM2egui.tex) and sample pages (JFM2esam.tex).

It is very important that the guidance on style given in these pages is followed: editorial changes to the author's file will be made by the printer, and this might cause a delay in publication.

For quick reference, the most important points are:

- Use a roman typeface in maths for: the d (or D) operator in differentials and integrals; i (square root of -1); e (exponential); units and abbreviations (see §5.2.1).
- Use the appropriate typeface for vectors, matrices and tensors (§5.2.1).
- Put punctuation after equations where appropriate (§5.1).
- Do not use small fractions (e.g. $\frac{gh}{u}$), except for numerals: in the text and for super- and subscripts use gh/u, and in displayed maths use gh/u or normal sized fractions (§5.1).
- Letters (*a, b*, etc.) associated with equation numbers, figure or table numbers and references are italic, and for figures and tables are in brackets unless they are in a phrase that is already in brackets (§§5.1, 3, 4).
- Use British spelling (centre, behaviour, modelling, emphasize, etc.) (§8).
- Hyphenate compound adjectives, e.g. high-frequency wave, solid-body rotation; and use a double hyphen (en rule) to indicate 'and' or 'to', e.g. Navier–Stokes, pressure–strain, pages 45–56 (§9).
- When a reference has three authors, on first mention in the text *all three* authors must be listed, and *et al.* used thereafter; use *et al.* from the start if there are four or more authors (§2.7.2).
- If a string of references in the text is in brackets, do not put brackets round the dates; separate the entries by semicolons (§2.7.2).
- Follow *JFM* style in the form and ordering of the list of References (§2.7.1).

2. General structure

2.1. *Title*

The title should be simple and concise. Only the first word is capitalized, apart from proper names. If the paper is part of a series then the title is styled 'Annular flow. Part 3. Experiments'.

2.2. *Authors and affiliations*

Authors' names appear together on the same line, capitalized. Addresses are listed separately below, with a superscript numeral to link each author to the appropriate address if there is more than one. Postal addresses must be given in full, including zip codes or the equivalent, and the country. E-mail address(es) can follow on a separate line. A new address can be indicated in a footnote to the author's name if necessary.

The 'received' and 'revised' dates will be inserted by the Editorial Office.

2.3. *Abstract*

The abstract should be self-contained and self-explanatory and contain a summary of purpose, methodology, results and conclusions. References and displayed equations should be avoided.

2.4. *Section headings*

Only the first word of the heading is capitalized, apart from proper names. *In the text* use the symbol § instead of spelling out the word 'section', except at the start of a sentence. Section headings are bold, so any maths symbols not normally bold, i.e. not vectors, should be changed to italic (see Input Guide).

2.5. *Acknowledgements*

Any financial support should be mentioned here. Dedications are not normally permitted.

2.6. *Appendices*

Any appendices appear between the acknowledgements and the references.

Long detailed appendices of interest to a few readers only are not printed, but are held in the Editorial Office and made available on request.

2.7. *References*

2.7.1. *The list of references*

References are listed at the end of the paper in strict alphabetical order (i.e. not ordered according to the number of authors or date). If the same author(s) has more than one publication in the same year, then *a, b,* etc. should be added after the year. Private communications are not included in the References; when they are mentioned in the text, initials of first names must be given. Articles that are 'submitted' or 'in press' may be included provided that the full title and the name of the Journal are given. Non-published material not widely available should be avoided.

The style of the References can be seen in any recent volume of the *Journal* and examples are given at the end of the Input Guide. Titles and last page numbers of articles are preferred, but can be omitted if done consistently. Titles of theses must be included. There is no need to add any part of the address of the publisher, nor words such as 'Press' or 'Verlag' that follow the publisher's name (except for University Presses, where omission of Press could cause confusion). Conference proceedings must include the editor(s) and publisher.

Short titles of Journals are based in general on the style of the *World List of Scientific Periodicals*. Letters denoting series are printed in roman type, e.g. *Proc. R. Soc. Lond.* A **432**, and contractions (e.g. Engng, Intl) are not followed by a point.

2.7.2. *References in the text*

References in the text should include the author(s) name, and the year in parentheses, unless the reference is already in parentheses, e.g. see Smith (1989) or (see Smith 1989). Strings of references in parentheses should be in date order and separated by semicolons, with no commas before the dates, e.g. (Jones 1967, 1978; Tam 1980; Dog 1991). Any page or section numbers etc. referred to should follow the date, after a comma, e.g. Smith (1987, p. 234).

If there are three authors, all the names are given on first mention, then just the first name and *et al.* subsequently. When there are four or more authors *et al.* is used from the start.

3. Figures

Figures are printed using CUP in-house software so postscript files should not be included. A 'dummy' amount of blank vertical space should be placed in the text, together with the caption.

Figures must be numbered sequentially in the order in which they are mentioned in the text.

Large areas of white space should be avoided, and complicated information should appear in the caption rather than on the figure. Avoid duplicating information on the figure and in the caption. Groups of similar figures should be numbered as parts (*a*), (*b*), etc. of the same figure, with a single caption.

In the text, the word 'figure' is never abbreviated, and only capitalized at the start of a sentence. Do not put parentheses around *a, b* etc. if the phrase is already in parentheses. The following are examples of forms: figure 1; figure 1 (*a, b*); figure 1 (*a–e*); figures 1 (*a*) and 1 (*b*); (figure 1 *a, b*); (figures 1 *a* and 1 *b*).

4. Tables

Tables, however small, must be numbered sequentially in the order in which they are mentioned in the text. The word 'table' is only capitalized at the start of a sentence. Each should have a caption.

There should be zeros before decimal points for numbers less than one, and powers of 10 rather than 'e-4' etc. should be used.

Extensive detailed tables of interest to a few readers only will be held in the Editorial Office and made available on request.

5. Mathematics

Details of how to use LaTeX to obtain the notation and style described in this section can be found in the JFM Input Guide or the LaTeX Manual.

5.1. *Layout of equations*

Long, complicated or important equations are displayed, and punctuated as part of the text. Numbered equations appear on separate lines, but related equations may be denoted (2 *a*), (2 *b*), etc. and if they are short, they should be on the same line, separated by a

space, and then numbered in the style (2 *a, b*), (2 *a–c*) etc. Two or more equations on separate lines but with the same number should be braced together. Displayed equations are centred and long ones should be broken before a + or a − sign. The symbol × should be used if the break has to be at a product. Words such as 'for', 'as' should be roman type with a space on each side.

Small fractions (e.g. $\frac{gh}{u}$) should only be used for numerals. To save space, short simple fractions should be typed with a slash rather than on two lines. Super- or subscript fractions are always one line, e.g. 1/2, not $\frac{1}{2}$.

Complicated expressions should be represented by a symbol rather than being written out in full each time.

When equations are referred to *in the text*, only the number in parentheses need be given, e.g. 'substituting (3.12) into (3.20) we obtain...' (avoid using numerals in parentheses for any other reason): the word 'Equation' is only needed at the start of a sentence and should never be abbreviated. Non-displayed equations within the text must be short and simple, and fractions must be on one line only, with a slash.

5.2. *Mathematical notation*

5.2.1. *Fonts*

Mathematical symbols are usually printed in the italic or sloping greek type normally produced by LaTeX. Avoid multiletter symbols such as KE for kinetic energy (use E_K instead) except for dimensionless numbers such as *Re, Pr* for Reynolds or Prandtl numbers, and then spacing between the two letters should be smaller than in normal LaTeX maths mode – see the Input Guide.

Non-italic fonts should be used as follows (see the Input Guide for how to obtain these fonts):

- *Roman*: roman type should be used for the following:
  to denote mathematical operations, e.g. sin, log, d (differential);
  constants e.g. i ($\sqrt{-1}$);
  exp or e;
  Ai, Bi (Airy functions);
  Re, Im (real, imaginary) not the LaTeXsymbols $\Re, \Im$;
  physical units (cm, s, etc);
  abbreviations such as c.c. (complex conjugate) and h.o.t. (higher-order terms).

Greek letters are styled equivalently, i.e. slanted for mathematical variables, but constants such as pi and mu (micro) and operators such as Δ (difference) are upright.

- *Bold italic or bold sloping greek*: for vectors (the centred dot for a scalar product should also be bold, and $\boldsymbol{\nabla}$ but not ∇^2).
- *Bold sloping sans serif*: for tensors and matrices.
- *Script*: an alternative to italic when the same letter is used to denote different quantities – use cal in LaTeX.

5.2.2. *Other symbols*

A symbol is not normally used to denote a product: use a multiplication symbol only when breaking a displayed equation, for vector products or between numbers, e.g. 106×10^4; use a centred point only for the scalar product of vectors.

Large numbers that are not scientific powers should not include commas, but have the form 1600 or 16 000 or 160 000.

Use O to denote 'of the order of'.

6. Units

The International System of Units (SI) should normally be used, with an exponent not a solidus, e.g. cm s^{-1} not cm/s. There should be a space between a number and its units, and there is no need to repeat the units in a list, e.g. 5 and 6 cm.

Use a low rather than centred decimal point.

Use % instead of writing out 'per cent' and ° instead of 'degrees'. On a figure the axis label should be (deg.) rather than using the symbol by each number.

7. Abbreviations

Only commonly accepted abbreviations can be used, and they must be defined at first occurrence. There should be points between lower-case letters in an abbreviation, but not between capital letters, e.g. p.d.f. , r.m.s. and LES. There is no point after a contraction, engng for example.

Do not use the following abbreviations: 2-D, 3-D, l.h.s., r.h.s., fig., eq.

8. Spelling and capitalization

Use British spelling conforming to the preferred spelling in the *Shorter Oxford English Dictionary*. Examples include behaviour, colour, centre, travelling, modelling, emphasize, zeroth, analyse.

Use initial capital letters for proper names and their derivatives, e.g. Gaussian, Lagrangian, Cartesian, Pitot, Perspex, Plexiglas. Figure, table, section should not be capitalized.

9. Punctuation and hyphenation

Hyphens should be used between compound adjectives, e.g. large-scale region, low-frequency wave, solid-body rotation, first-order equation (but only when preceding the noun, e.g. 'equation of first order' has no hyphen). Self-, cross- and half- are always followed by a hyphen (e.g. self-interaction, cross-section, half-width), and a hyphen follows 'non', apart from nonlinear. Nouns with prefixes and compound nouns should normally be one word (e.g. coordinate, cutoff, breakup, predetermined, bandwidth, subgrid) unless there is a repeated letter (e.g. semi-infinite, over-relaxation). Other examples of nouns that are normally printed as one word include wavenumber, wavelength, sidewall, arclength. On the other hand, examples of two separate words include time scale, length scale, time step, flow field.

En rules (keyed as a double hyphen) should be used when replacing 'and' or 'to', e.g. gravity–capillary, Navier–Stokes, 10–20 cm. A comma is not needed after an abbreviating point, for example e.g. or i.e. or cf. nor between lists of adjectives, e.g. long thin slow-moving cylinder. When a complete sentence is inside parentheses, then so is the final full stop.

10. Some miscellaneous style points

Avoid footnotes since they interrupt the reading of the text.

Separate lists of nomenclature are not normally permitted. Symbols should be defined and explained on first appearance in the text.

Italics should seldom be used for emphasis, but may be needed in definitions and for foreign words.