Preprint Template for ASME Journal Papers: asmejour.cls

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This paper is an example and template for the asmejour *class. Papers typeset in this class will follow ASME journal style for margins, fonts, headings, captions, and reference formats. Standard LATEX commands are used. The class will lay out the author, title, and abstract in ASME style. The class will produce a pdf file that that includes hyperlinks, bookmarks, and pdf metadata. The class is intended to be used with the* asmejour.bst *BIBTEX style for typesetting references, which is part of this distribution. This style supports hyperlinks and modern reference formats, following current ASME practice. The class may be invoked with several options, most of which address math fonts. The class calls a number of packages, all of which are in* TEX *Live and in CTAN (ctan.org). The class is compatible with* pdfLATEX *or* LuaLATEX.

Keywords: ASME, Paper, Template, LATEX, BIBTEX

1 Introduction

The asmejour class file will typeset papers with margins, fonts, headings, captions, and reference formats that follow those used in journals published by the American Society of Mechanical Engineers (ASME). Internal and external hyperlinks will be set automatically, and the pdf file will contain bookmarks and metadata.

This class is not a publication of ASME. The intended use of this package is to allow authors to format their papers in ASME style prior to submission to an ASME journal for peer review.

The .tex file may be written using standard LATEX commands, although some specific initial commands are needed to format the block containing the author[s], title, and abstract.

1.1 Essential Initial Commands. To begin, fill in the fields to be completed at top of the asmejour-template.tex file. The pdf metadata will be placed into the pdf file itself.

For each author, put author names and affiliation (with line breaks) into a separate \SetAuthorBlock{name}{affiliation} command; follow the syntax illustrated asmejour-template.tex file. One author (or more) may be designated as the \CorrespondingAuthor by placing the command at the end of the name.

The title should be placed into \title{..}, and line breaks may be specified if desired. Keywords may optionally be including using the \keywords{..} command; this command *must* be issued before the abstract. The abstract text must be placed into \begin{abstract}...\end{abstract}. The abstract will automatically be italicized.

The date is given as an unnumbered footnote, which deafults to \today. Other text for \date{..} may be specified. Putting \date{} will suppress the footnote.

After setting up the authors, title, and abstract, issue the \maketitle command.

1.2 Optional to the Color Title Bar. The vertical bar in the title block is black in all ASME journals. Since the asmejour class is only for preprints, we include the [fun] option to have the bar in color. Any color name recognized by the xcolor package may be invoked by including the option barcolor=name in the \documentclass[..]{asmejour} command. The color name is Red4 by default. (To have a black bar, either omit the option entirely or use the name black.)

2 References to Figures, Equations, and Citations

For ASME papers, the labels Figure and Equation should be abbreviated when they do not start a sentence, as in Fig. 1 and Eq. (1). Figure 1 is spelled out when it starts a sentence. Equation (1) is spelled out when it starts a sentence.

Citations will be numbered automatically [1]. They should be inserted at the appropriate point using a \cite{ref} command [2, 3]. The citations will be automatically sorted and compressed, as well, if they are given in a set [1, 4–9]. Just refer to the number when naming a reference, as in [8]. Reference [8] is appropriate at the beginning of a sentence. See the asmeconf-sample.bib file for examples of how to enter your references.

Equations are typeset in the usual way. The class file loads the amsmath and mathtools packages. Further, the newtxmath package used for the math fonts includes many additional features.

$$\mathbf{q} = -k\nabla T \qquad (1)$$

3 Section Headings and Captions

ASME requires that section headings and captions be set in bold face. In addition, the captions must be in sans serif type. The asmejour class will do this automatically. You can place \cite{..}, \ref{..}, \label{..}, and into headings and captions directly, as you would in the main text. You can place \footnote{..} into headings, but not into captions.[2]

Sections may either be numbered or left unnumbered. ASME publishes papers in either style.

Math can be used in either captions or section headings, and an appropriate math font will be automatically selected. For a section heading that includes complicated math (and macros), you may use the optional argument of \section[..]{..} to create a pdf bookmark without losing characters or producing warnings or errors. See the asmejour-template.tex source file for examples of this. These bookmarks should usually be text expressions, although some math is supported.

If you wish to override the default math format in a heading or caption, put \mathversion{normal} in the heading or caption. (The newtxmath package [10] includes a complete set of bold math fonts, however, so the need to override should be rare.)

Single-sentence captions should not end with a period. Multi-sentence captions do include periods.

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[2]See tex-stackexchange for various approaches to footnotes in captions, if they seem necessary. For footnotes in tables, use the tablefootnote package.
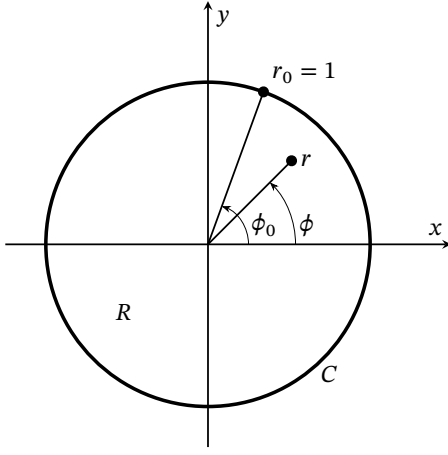
Fig. 1 A figure caption with math, Eq. (1): $z = (r, \phi)$ [11]

3.1 Subsection Headings. Section, subsection, and subsection headings should be in title case (first letter of primary words capitalized). ASME does not use \paragraph, so the class file treats this commands like \subsubsection.

4 More on Math

To get bold math outside of the captions, you can use the \bm{..} macro from the bm package, which is loaded by the class.

$$S = k \ln w \tag{2}$$

Math italics are used for roman and lower-case greek letters by default. If you want an upright letter in math, you can use the relevant math alphabet, e.g., \mathrm, \mathbf, \mathsf:

$$\vec{F} = m\vec{a} \quad \text{or} \quad \vec{\mathrm{F}} = m\vec{\mathrm{a}} \quad \text{or} \quad \mathbf{F} = m\mathbf{a} \quad \text{or} \quad \vec{\mathsf{F}} = m\vec{\mathsf{a}} \tag{3}$$

ASME typesets vectors in upright bold, like the third instance in Eq. (3), and sets matrices in bold italic. In the next equation $\mathbf{w}$ is a vector and $\boldsymbol{J}_1$ is a matrix:

$$d\mathbf{w} = \begin{pmatrix} du \\ dv \end{pmatrix} = \underbrace{\begin{pmatrix} \partial u/\partial x & \partial u/\partial y \\ \partial v/\partial x & \partial v/\partial y \end{pmatrix}}_{= \boldsymbol{J}_1} \begin{pmatrix} dx \\ dy \end{pmatrix} \tag{4}$$

The newtxmath package includes a large number of options for mathematics, most of which can be called as options to \documentclass. For example, the upint option of newtxmath selects upright integral signs (rather than slanted integral signs):

    \documentclass[upint]{asmejour}.

These math options are discussed further in the asmejour-template.tex file.

In addition, many options for calligraphic, script, and fraktur fonts are available as options to the mathalfa package, which is also loaded. These may be invoked, for example, as

    \documentclass[mathalfa=cal=euler]{asmejour}

which selects the Euler font for \mathcal (this is our default). To find all the font options, refer to the mathalfa package documentation [12].

The typewriter font loaded is inconsolata (which is sans serif), as suggested by the newtx package documentation. The class is not set up for use with the fontspec or unicode-math packages.

4.1 Units and Nomenclature. ASME requires SI units. U.S. style units may be follow in parentheses. Be sure to put your symbols into the nomenclature list, including the SI units.

Table 1   A simple table

Experiment	u [m/s]	T [°C]
Run 11	12.5	103.4
Run 12	24	68.3

5 Tables and Figures

Table 1 is an example of a simple table. Table captions should be placed above tables. The class loads the array and dcolumn packages which provide extended capabilities for columns in the tabular environment (used in Tables 2 and 3). Table 3 is designed to have exactly the width of a text column.

The booktabs package [13] is loaded (and customized) to provide versions of \toprule, \midrule, and \bottomrule} appropriate to ASME-style tables.

Table 4 shows a table that spans both text columns. Figure 2 shows a figure spanning both columns.

Text in the figures should be checked for legibility at either single-column width (about 83 mm) or full-column width (about 170 mm). Figure captions should be placed below figures. Images in figures are handled by the standard graphicx package.

Landscape figures and tables may be produced at full-page size by putting \usepackage[figuresright]{rotating} in your .tex file's preamble and using the sidewaystable* and sidewaysfigure* environments [14].

6 Reference Formatting with `asmejour.bst`

The asmejour.bst BIBTEX style follows the reference styles observed in ASME journals in 2019. The vast majority of published references are to journal papers and books. Examples for these and many other cases are given in the asmejour-sample.bib file, which is part of this distribution. Citations and references are managed by the standard natbib package. Nevertheless, a few comments are necessary.

6.1 Hyperlinked Titles. If an @article{.. or @book{.. includes doi={..}, the journal title will be hyperlinked to that doi number, and the doi number will not be printed. If no doi is included, but a url is included, then the title will be hyperlinked to that url. To display the doi (or the url when no doi is given), put it into the note={..} field:

   note = {\doi{10.1115/1.4042912}}

Include doi numbers in references whenever possible.

Elementary support for eprint numbers is also included, generating a url at the end of the citation. The archive type may be specified using the macros arxiv, googlebooks, hndl, jstore, or pubmed (e.g., archive=hndl, *without* braces). Both eprint and archive fields *must* be given. Other root urls may be invoked using archive = {http://another.url.org/}.

6.2 Online Sources. A bibliography field @online{.. is included for citation of online sources, such as web pages. See the examples of use in the asmejour-sample.bib file.

6.3 Date Accessed. The urldate={..} field may be used to provide the date on which a given url was accessed. By default, the text printed will be accessed 'date',. The word "accessed" may be changed using the urltype={..} field.

6.4 Conference Location and Date. For the entry types @inproceeedings{.. and @proceeedings{.., you may include venue={..} and eventdate={..} to specify the city and the date of a conference.
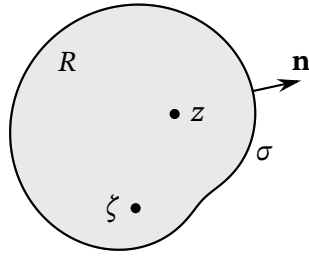
(a) Interior region
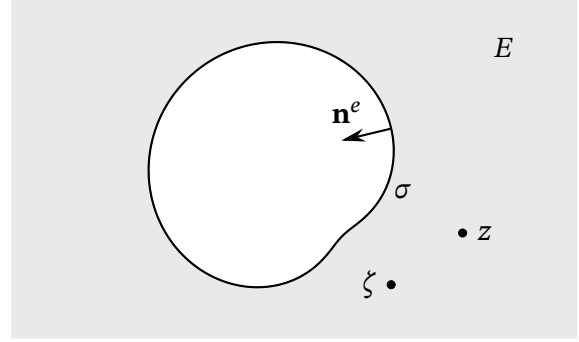
(b) Exterior region

Fig. 2   A figure with two subfigures [11]

Table 2   Table with more complicated columns

Experiment	u [m/s]	T [°C]
The first experiment we ran this morning	124.3	68.3
The second experiment we ran this morning	82.50	103.46
Our competitor's data	72.321	141.384

Table 3   Table at full column width with columns in math mode

X_z	X_c	$X_{c,m}$	$X_{c,2}$
3.92069	5.70943	6.32429	7.08757
$\varepsilon(T_1)$	$\varepsilon^i(T_1)$	$\varepsilon^i(T_m)$	$\alpha(T_1, T_2)$
0.7258	0.6237	0.6807	0.7964
q_{gray}	q_{int, T_1}	q_{int, T_m}	q_{exact}
400.2	462.1	371.0	371.8

6.5   Version Number[3]**.** The version={..} field may be used with @book, @online, and @manual. By default, the text will read Version 'number' as in [10, 12], but different wording may be selected using the versiontype={..} field, to have "Revision" or something similar, as in [15]. ASME often puts the version in the title, as in [16, 17], so I've left the final decision for discussion between the authors and the copy editor.

7   Additional Options for `asmejour.cls`

The class accepts a number of options in addition to those already described.

7.1   Final Column Balancing. The option [balance] invokes the the flushend package [18]. This package will attempt to give equal height to the two columns on the last page. The performance of this package is sometimes inconsistent (with odd page layout or, very rarely, errors), so use this option with caution.

7.2   Line Numbers. The option [lineno] invokes the the lineno package [19]. This will produce line numbers in the margins. You must run LATEX twice for proper placement of the numbers. The lineno package is not compatible with the flushend package that makes final short columns the same height. Balancing is disabled when this option is called. See the documentation of the lineno package for further commands to control line numbering. See footnote 3 with regard to footnotes in section headings while this option is in effect. The abstract, tables, captions, and footnotes will not be numbered.

7.3   Changing the Footer Text. The option [nofoot] will omit everything other than a page number from the page footer. The option nocopyright will omit the ASME copyright from the first page footer. The command \PreprintString{..} replaces the words PREPRINT FOR REVIEW. The left and right preprint strings can be changed separately using an optional argument: \PreprintString{..}[L] and \PreprintString{..}[R]. The

final paper number may be added to the page number using \PaperNumber{..}.

The footers are all generated with the fancyhdr package [20], so you can change them in any way you like using the commands of that package.

7.4   Superiors Font. The newtxtext package includes a superiors font (both numbers and letters) for use in footnote markers and superscripts. To enable this font, use the option [nodefault-sups]. The corresponding author mark in the author block will not change.

8   Math in a Section Heading: $\hat{\omega} \cdot \hat{U} = 0$

To include complicated math in a section heading without producing bookmark-related errors, use the optional argument of \section to create the pdfbookmark. The heading above was set with the following command:

```
\section*[Math in a Section Heading:
  \omega\cdot U=0]{Math in a Section Heading:
  $\hat{\upomega}\cdot\hat{\mathrm{U}}=0$}
```

Note that bookmarks can include simple math. Also note that newtxmath provides the option to obtain upright Greek letters as \upomega (vs. \omega), etc.

9   Summary

The class asmejour and associated files are for typesetting preprints in the style of ASME journals. Documentation is provided in this file and by comments in the .tex source code. Examples of entering references are shown in the asmejour-sample.bib file. The asemjour.bst file produces references following ASME's current formats. This package is not a publication of ASME and is offered without charge under the terms of the MIT license.

(1) First conclusion
(2) Second conclusion
(3) Third conclusion

---

[3]Footnotes can appear in \section commands. However, when the [lineno] option is used either: i) write \protect\footnote{..}; or ii) include the optional argument, as in \section[Foo]{Foo\footnote{..}}.

Table 4 A table spanning two columns

x	erf(x)	erfc(x)	x	erf(x)	erfc(x)
0.00	0.00000	1.00000	1.10	0.88021	0.11980
0.05	0.05637	0.94363	1.20	0.91031	0.08969
0.10	0.11246	0.88754	1.30	0.93401	0.06599
0.15	0.16800	0.83200	1.40	0.95229	0.04771
0.20	0.22270	0.77730	1.50	0.96611	0.03389
0.30	0.32863	0.67137	1.60	0.97635	0.02365
0.40	0.42839	0.57161	1.70	0.98379	0.01621
0.50	0.52050	0.47950	1.80	0.98909	0.01091
0.60	0.60386	0.39614	1.8214	0.99000	0.01000
0.70	0.67780	0.32220	1.90	0.99279	0.00721
0.80	0.74210	0.25790	2.00	0.99532	0.00468
0.90	0.79691	0.20309	2.50	0.99959	0.00041
1.00	0.84270	0.15730	3.00	0.99998	0.00002

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Nomenclature

$\overline{h}$ = average heat transfer coefficient (W m^{-2} K^{-1})
k = thermal conductivity (W m^{-1} K^{-1})
$\mathbf{q}$ = heat flux vector (W m^{-2})

Greek Letters

α = thermal diffusivity (m^2 s^{-1})
ν = kinematic viscosity (m^2 s^{-1})

Dimensionless Groups

Pr = Prandtl number, ν/α

Superscripts and Subscripts

b = bulk value
∞ = free stream value

Appendix A: Dealing with Wide Equations

In most cases, the need for a wide equation can be eliminated by using one of the multiline equation environments defined by `amsmath`, such as `align`, `split`, or `multline` [21]. An example appears in Appendix B. An alternative solution may be to set large equations into two-column-wide tables or figures. While a package exists for setting equations that span two columns (`widetext.sty`), that code is erratic in relation to floats and page breaks.

Appendix B: Incomplete Zeta Function [22]

This text is just an illustration. The radiation fractional function may be written in terms of the incomplete zeta function for convenience:

$$f(\lambda T) = \frac{1}{\sigma T^4} \int_0^\lambda \frac{2\pi h c_o^2}{\lambda^5 \left[\exp(h c_o / k_B T \lambda) - 1\right]} \, d\lambda \qquad \text{(B1)}$$

$$= \frac{1}{\sigma T^4} \frac{2\pi k_B^4 T^4}{h^3 c_o^2} \int_{c_2/\lambda T}^\infty \frac{t^3}{e^t - 1} \, dt \qquad \text{(B2)}$$

When $\lambda T \to \infty$, $f = 1$ and the last equation yields the well-known result

$$\sigma T^4 = \frac{2\pi k_B^4 T^4}{h^3 c_o^2} \underbrace{\int_0^\infty \frac{t^3}{e^t - 1} \, dt}_{\equiv \zeta(4)\Gamma(4)} \qquad \text{(B3)}$$

where the Gamma function $\Gamma(4) = 3!$ and the Riemann zeta function, $\zeta(4)$, has the indicated integral representation [23, §13.12]. A classical result due to Euler [24] gives $\zeta(4) = \pi^4/90$ (see also [25, §167]), from which we recover the usual definition of the Stefan-Boltzmann constant, σ.

Appendix C: Language Support

ASME publishes in English, but the `babel` package is loaded for users who may wish to include other languages. Options are supported to load a primary language, `lang=`, as well as a secondary and tertiary language, `lang-second` and `lang-third`. The primary language must be given as the *last* language option in `\documentclass`.

If no language option is given, the package defaults to English. The standard caption and section names will follow `babel`'s dictionary for primary languages other than English. Users may additionally change "Keywords", "Nomenclature", and "Corresponding author" by renewing the commands `\keywordname`, `\nomname`, and `\CAwords`. Changes to the page footer were described earlier. The pdf bookmark for "Appendices" by be changed by renewing `\appendicesname`.

An example of use is shown in Annexe D.

Font encoding is set to T1 with utf-8 input supported: àáâäæãåā èéęëêē îíïíìì ôöòóœøōō ûüùúū çćč ł ñń ßśš ÿ žźż

No effort has been made to support customization of language-specific fonts, although this is possible by modifying the class file (examples are given in the `newtx` documentation). The bibliography style, `asmejour.bst`, is designed in English and aimed at BibTeX. Multilingual bibliographies can be supported using BibLaTeX.

Annexe D: Joseph Fourier

Joseph Fourier est connu pour avoir déterminé, par le calcul, la diffusion de la chaleur en utilisant la décomposition d'une fonction quelconque en une série trigonométrique convergente. De telles fonctions sont appelées séries de Fourier. La méthode de calcul permettant de passer, de façon réversible, d'une fonction à la série trigonométrique correspondante est la transformation de Fourier [26].

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