

Preprint Template for ASME Journal Papers: asmejour.cls

Author Name[s]

Department of Mechanical Engineering,
Institution or Company Name,
Street address,
City, State, Country
email: xxx@yyy.zzz

John H. Lienhard V¹

Rohsenow Kendall Heat Transfer Laboratory,
Department of Mechanical Engineering,
Massachusetts Institute of Technology,
Cambridge, MA 02139 USA
email: lienhard@mit.edu

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 L^AT_EX commands are used. The class will lay out the author, title, and abstract in ASME style. The class will produce a pdf file that includes hyperlinks, bookmarks, and pdf metadata. The class is intended to be used with the asmejour.bst BIB_TE_X 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 T_EX_{LIVE} and on CTAN (ctan.org). The class is compatible with pdf_LT_EX or Lua_LT_EX.

Keywords: ASME, Paper, Template, L^AT_EX, BIB_TE_X

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 L^AT_EX commands, although some specific initial commands are needed to format the block containing the author[s], title, and abstract.

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 \SetTitle{...}, and line breaks may be included if desired. Keywords may optionally be included using the \keywords{...} command; this command *must* be issued before the abstract. The abstract text must be placed into \SetAbstract{...}. The abstract will automatically be italicized.

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

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.)

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]. 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.

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

Be sure to put your symbols into the nomenclature list, including SI units.

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.)

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

¹Corresponding author

²See tex-stackexchange for various approaches to footnotes in captions, if they seem necessary. For footnotes in tables, use the tablefootnote package.

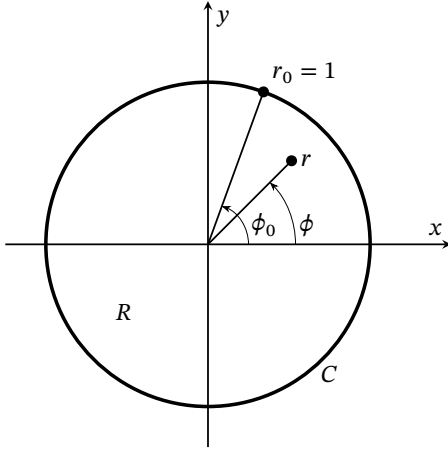


Fig. 1 A figure caption with math, $z = (r, \phi)$ [12]

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.

$$S = k \ln w \quad (2)$$

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

$$\vec{F} = m\vec{a} \quad \text{or} \quad \vec{F} = m\vec{a} \quad \text{or} \quad \mathbf{F} = m\mathbf{a} \quad \text{or} \quad \vec{F} = m\vec{a} \quad (3)$$

ASME typesets vectors in upright bold, like the third instance in Eq. (3), and sets matrices in bold italic.

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

```
\documentclass[upint]{asmejour}.
```

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 [11].

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.

Tables

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. Table 4 shows a table that spans both text columns.

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. Nevertheless, a few comments are necessary.

Table 1 A simple table

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

Hyperlinked Titles. If an `@article{...}` or `@book{...}` includes `doi={...}`, the journal title will be hyperlinked to that doi number. 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}}
```

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 fields *must* be given. Other root urls may be invoked using `archive = {http://another.url.org/}`.

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.

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.

Location and Date of Conference. For `@inproceedings{...}` and `@proceedings{...}`, you may include `venue={...}` and `eventdate={...}` to specify the city and the date of a conference.

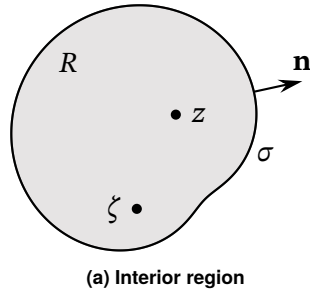
Version Number³. The `version={...}` field may be used with `@book`, `@online`, and `@manual`. By default, the text will read Version ‘number’ as in [10, 11], but different wording may be selected using the `versiontype={...}` field, to have “Revision” or something similar, as in [13]. ASME often puts the version in the title, as in [14, 15], so I’ve left the final decision for discussion between the authors and the copy editor.

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

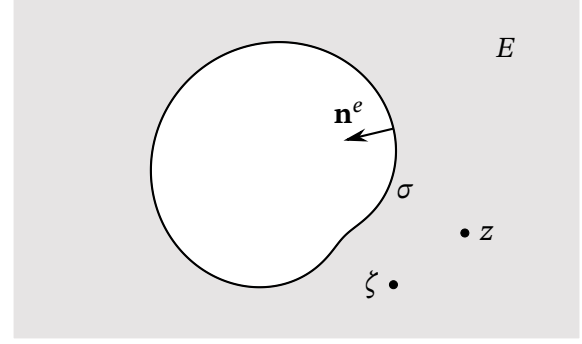
The rest of this is fake Latin text to demonstrate formats. Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

Subsection Heading. Etiam euismod. Fusce facilisis lacinia dui. Suspendisse potenti. In mi erat, cursus id, nonummy sed, ullamcorper eget, sapien. Praesent pretium, magna in eleifend egestas, pede pede pretium lorem, quis consectetur tortor sapien facilisis magna. Mauris quis magna varius nulla scelerisque imperdiet. Aliquam non quam. Aliquam porttitor quam a lacus. Praesent vel arcu ut tortor cursus volutpat. In vitae pede quis diam bibendum placerat. Fusce elementum convallis neque. Sed dolor

³Another longer footnote to show the leading and line breaking, and how it will sit at the bottom of a column. Another longer footnote to show the leading and line breaking, and how it will sit at the bottom of a column.



(a) Interior region



(b) Exterior region

Fig. 2 A figure with two subfigures [12]

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

orci, scelerisque ac, dapibus nec, ultricies ut, mi. Duis nec dui quis leo sagittis commodo.

Aliquam lectus. Vivamus leo. Quisque ornare tellus ullamcorper nulla. Mauris porttitor pharetra tortor. Sed fringilla justo sed mauris. Mauris tellus. Sed non leo. Nullam elementum, magna in cursus sodales, augue est scelerisque sapien, venenatis congue nulla arcu et pede. Ut suscipit enim vel sapien. Donec congue. Maecenas urna mi, suscipit in, placerat ut, vestibulum ut, massa. Fusce ultrices nulla et nisl.

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

Note ASME style for vectors, \mathbf{w} , and matrices, \mathbf{J}_1 .

Third Level Heading. Aliquam lectus. Vivamus leo. Quisque ornare tellus ullamcorper nulla. Mauris porttitor pharetra tortor. Sed fringilla justo sed mauris. Mauris tellus. Sed non leo. Nullam elementum, magna in cursus sodales, augue est scelerisque sapien, venenatis congue nulla arcu et pede. Ut suscipit enim vel sapien. Donec congue. Maecenas urna mi, suscipit in, placerat ut, vestibulum ut, massa. Fusce ultrices nulla et nisl.

Summary

Curabitur tellus magna, porttitor a, commodo a, commodo in, tortor. Donec interdum. Praesent scelerisque. Maecenas posuere sodales odio. Vivamus metus lacus, varius quis, imperdiet quis,

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

rhoncus a, turpis. Etiam ligula arcu, elementum a, venenatis quis, sollicitudin sed, metus. Donec nunc pede, tincidunt in, venenatis vitae, faucibus vel, nibh. Pellentesque wisi. Nullam malesuada. Morbi ut tellus ut pede tincidunt porta. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam congue neque id dolor.

- (1) First conclusion
- (2) Second conclusion
- (3) Third conclusion
- (4) Fourth conclusion

Acknowledgement

Curabitur tellus magna, porttitor a, commodo a, commodo in, tortor. Donec interdum. Praesent scelerisque. Maecenas posuere sodales odio. Vivamus metus lacus, varius quis, imperdiet quis, rhoncus a, turpis. Etiam ligula arcu, elementum a, venenatis quis, sollicitudin sed, metus. Donec nunc pede, tincidunt in, venenatis vitae, faucibus vel, nibh. Pellentesque wisi. Nullam malesuada. Morbi ut tellus ut pede tincidunt porta. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam congue neque id dolor.

Funding Data

- U.S. Department of Heat Transfer, Office of Important Ideas (DOHT Award No. 3.14159265)

Nomenclature

- \bar{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 (m² s⁻¹)
 ν = kinematic viscosity (m² s⁻¹)

Dimensionless Groups

Pr = Prandtl number, ν/α

Superscripts and Subscripts

- b = bulk value
 ∞ = free stream value

Appendix A: Incomplete Zeta Function [16]

The radiation fractional function may be written in terms of the incomplete zeta function for convenience:

$$f(\lambda T) = \frac{1}{\sigma T^4} \int_0^\lambda \frac{2\pi h c_o^2}{\lambda^5 [\exp(hc_o/k_B T \lambda) - 1]} d\lambda \quad (A1)$$

Table 4 A table spanning two columns

x	$\text{erf}(x)$	$\text{erfc}(x)$	x	$\text{erf}(x)$	$\text{erfc}(x)$
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

$$= \frac{1}{\sigma T^4} \frac{2\pi k_B^4 T^4}{h^3 c_o^2} \int_{c_2/\lambda T}^{\infty} \frac{t^3}{e^t - 1} dt \quad (\text{A2})$$

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

$$\sigma T^4 = \frac{2\pi k_B^4 T^4}{h^3 c_o^2} \underbrace{\int_0^{\infty} \frac{t^3}{e^t - 1} dt}_{\equiv \zeta(4)\Gamma(4)} \quad (\text{A3})$$

where the Gamma function $\Gamma(4) = 3!$ and the Riemann zeta function, $\zeta(4)$, has the indicated integral representation [17, §13.12]. A classical result due to Euler [18] gives $\zeta(4) = \pi^4/90$ (see also [19, §167]), from which we recover the usual definition of the Stefan-Boltzmann constant, σ .

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