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PLACE TITLE HERE: PLACE SUBTITLE AFTER COLON

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ABSTRACT

This paper is an example and template for typesetting ASME Conference Papers in LaTeX *using the* `asmeconf` *class. This class follows ASME guidelines for margins, fonts, headings, captions, and reference formats as of early 2020. The class is compatible with the* `hyperref` *package for producing pdf files with links. The optional argument of* `\section` *has been modified for manually setting pdf bookmarks when macros or complicated mathematics are included in section headings. The class is intended to be used with the* `asmeconf.bst` BibTeX *style, which is part of this distribution. 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 on CTAN. The class is compatible with* pdfLaTeX *or* LuaLaTeX.

Keywords: ASME, Paper, Template, LaTeX, Research

NOMENCLATURE

Roman letters

k	Thermal conductivity [W m^{-1} K^{-1}]
$\vec{q}$	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
Sc	Schmidt number, $\nu/\mathcal{D}_{1,2}$

Superscripts and subscripts

b	bulk value
∞	free stream value

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Documentation for `asmeconf.cls`. Version 1.17; February 29, 2020.

1. INTRODUCTION

The `asmeconf` class file will typeset papers with margins, fonts, headings, captions, and reference formats that follow those specified for conference papers of 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 `.tex` file may be written using standard LaTeX commands, although some specific initial commands are needed to format the blocks containing the author[s], title, and abstract. This class loads a number of other packages, all of which are contained in up-to-date versions of TeX Live, MacTeX, and similar distributions. If you find you are missing one of these packages, you may obtain it from CTAN (ctan.org).

1.1 Essential Initial Commands

To begin, fill in the fields to be completed at top of the `asmeconf-template.tex` file. These fields include the headers for your conference and your paper number. Specified metadata will be placed into the pdf file itself. The title should be placed into `\title{..}`.

Put author names into the `\SetAuthors{name, name,...}` command in the desired order; follow the syntax illustrated `asmeconf-template.tex` file. Put each distinct address sequentially into a separate `\SetAffiliation{n}{address}`, where $n = 1, 2, \ldots$ Tag each author with the right affiliation by putting `\affil{n}` after that author's name inside the `\SetAuthors{..` command.

Author addresses are to be kept short. List the author institution, and the City, State (US authors), City, Province, Canada (Canadian authors), or City, Country (other international authors).

One author (or more) may be designated as the corresponding author by placing `\CorrespondingAuthor{email}` after `\affil{#}`. Two or more authors may be joint first authors by putting `\JointFirstAuthor` after `\affil{#}`.

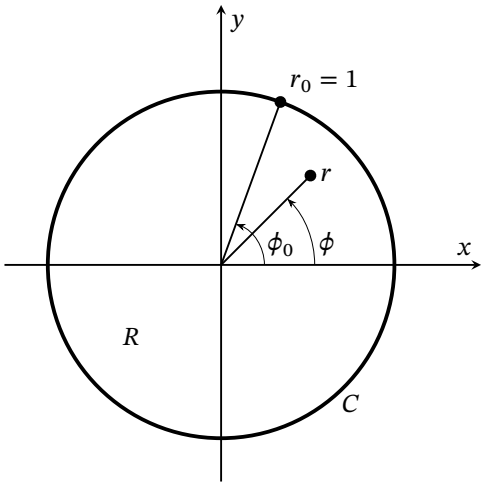


FIGURE 1: FIGURE CAPTION WITH MATH, EQN. (1): $z = (r, \phi)$ [1]

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

The abstract text must be placed into `\begin{abstract}..\end{abstract}`. The abstract will automatically be italicized. Keywords may optionally be including using the `\keywords{..}` command. This command *must* be issued before the abstract environment.

2. EQUATIONS AND NOMENCLATURE

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 (see Sect. 6).

$$\vec{q} = -k\nabla T \tag{1}$$

ASME prefers SI units. U.S. style units may follow in parentheses. Be sure to put your symbols into the nomenclature list, including the units.

For ASME conference papers, the labels Equation and Figure should be abbreviated when they do not start a sentence, as in Eq. (3) and Fig. 1. Figure 1 is spelled out when it starts a sentence. Equation (3) is spelled out when it starts a sentence.

3. SECTION HEADINGS AND CAPTIONS

ASME requires that section headings and captions be set in an uppercase, sans serif font. The class will do this automatically. You can place `\cite{..}`, `\ref{..}`, `\label{..}`, and mathematics into headings and captions directly, as you would in the main text. Do not enclose them braces, e.g. `{\cite{..}}`, which will cause errors. You can place `\footnote{..}` into headings, but not into captions.[1,2]

Text in section headings and captions will not be capitalized if enclosed in a `\NoCaseChange{..}` command.

Sections may either be numbered or left unnumbered.

Simple mathematical expressions can be used in either captions or section headings. For a section heading that includes more 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 `asmeconf-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 captions, put `\mathversion{normal}` in the caption.

3.1 Subsection and Sub-subsection Headings

Subsections and sub-subsection headings should be entered in title case, with the first letter of primary words capitalized. Sub-subsections (i.e., paragraphs) are never numbered.

TABLE 1: A SIMPLE TABLE

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

TABLE 2: TABLE WITH MORE COMPLICATED COLUMNS

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

4. TABLES AND FIGURES

Table 1 is an example of a simple table. Table captions should be placed above tables. The class loads the `booktabs` package (used for horizontal rules in both Table 1 and 2), and the `array` and `dcolumn` packages which provide extended capabilities for columns in the `tabular` environment (used in Table 2). Table 3 is an example of a table that spans two columns.

Figure captions go below figures. Figure 2 is an example of a figure that spans two columns and includes subfigures. The text in figures (and tables) should be no smaller than 6 point type. Images in figures are handles 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 [2].

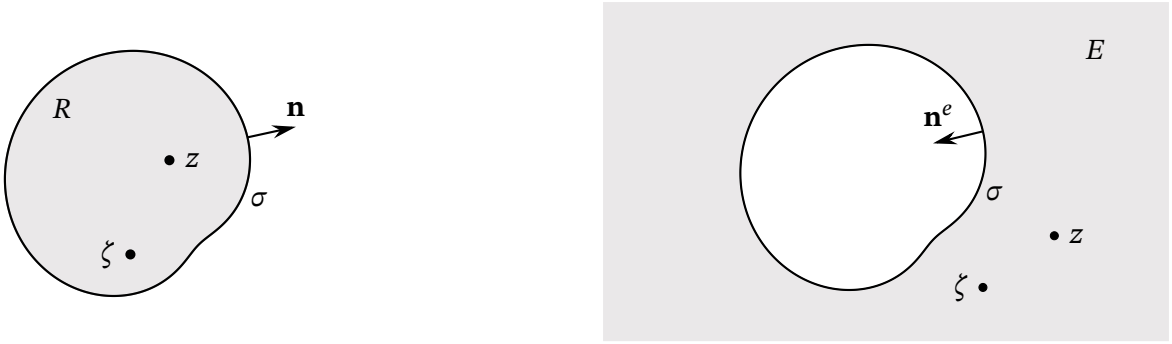
5. REFERENCE FORMATTING WITH `asmeconf.bst`[3]

Citations are automatically numbered [3]. They should be inserted at the appropriate point using a `\cite{ref}` command [4, 5]. The citations will be automatically sorted and compressed as well if they are given in a set [3–9]. See the `asmeconf-sample.bib` file for examples of how to enter your references. Citations and references are managed by the standard `natbib` package.

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

[2] Sequential footnote.

[3] If you have text in a section heading or caption that you do not want to be capitalized, such as an SI unit, enclose it in a `\NoCaseChange` command.



(a) Interior region

(b) Exterior region

FIGURE 2: A FIGURE WITH TWO SUBFIGURES [1]

The `asmeconf.bst` BibTeX style follows the reference styles posted on ASME's conference web site in early 2020. Examples for these and many other cases are given in the `asmeconf-sample.bib` file, which is part of this distribution. Nevertheless, a few comments are necessary.

DOI, URL, and eprint. Include DOI numbers when they are available. URL's may alternatively be given.

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/}`.

Online Sources. A bibliography field `@online{..` is included for citation of online sources, such as web pages. See the examples of use in the `asmeconf-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.

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.

6. MORE ON MATH: $\vec{u} \cdot \vec{\omega} = 0$

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` [10]. The following equation is set with the `multline` environment:

$$\frac{\partial}{\partial t}\left[\rho\left(e+|\vec{u}|^2/2\right)\right]+\nabla\cdot\left[\rho\left(h+|\vec{u}|^2/2\right)\vec{u}\right] = -\nabla\cdot\vec{q}+\rho\vec{u}\cdot\vec{g}+\frac{\partial}{\partial x_j}\left(d_{ji}u_i\right)+\dot{Q}_v \quad (2)$$

An example using `align` appears in Appendix A.

An alternative solution may be to set large equations into two-column-wide tables or figures. (You can find code online that sets equations across two columns, but the results may be sketchy.)

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`:

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

To get additional symbols in bold math, you can use the `\bm{..}` macro from the `bm` package, which is loaded by the class.

The class file also provides upright sans-serif greek letters with `\sfalpha` and similar expressions (e.g. $\mathsf{\alpha, \beta, \gamma, \delta \ldots}$ $\mathsf{\boldsymbol{\alpha, \beta, \gamma, \delta \ldots}}$), in case they are needed (but note that the `newtxmath` options `frenchmath` and `slantedGreek` also affect how greek letters are presented).

6.1 The `newtxmath` and `mathalpha` packages [11, 12]

The `newtxmath` package [11], loaded by default, includes a large number of options for mathematics. Most options 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]{asmeconf}.
```

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]{asmeconf}
```

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.

7. ADDITIONAL OPTIONS FOR `asmeconf.cls`

The class accepts a number of options in addition to those already described. These options are discussed next.

7.1 Colored hyperlinks

ASME requires that all text be in black when the paper is submitted for publication. For other uses, authors may obtain colored hyperlinks with the [colorlinks] option.

7.2 Final Column Balancing

The option [balance] invokes the the flushend package [13]. 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.

7.3 Line Numbers

The option [lineno] invokes the the lineno package [14]. This option will produce line numbers in the margins. You must run LaTeX *twice* for proper placement of the numbers. Tables, captions, and footnotes will not be numbered. Line numbers can be helpful for review and editing, but should not be used in your final manuscript. See the documentation of the lineno package for further commands to control line numbering.

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.

7.4 Changing the Footer Text

The option [nofoot] will omit the ASME copyright from the first page footer. The footers are generated with the fancyhdr package [15], so you can change them in any way you like using the commands of that package. Only the default arrangement of footers matches ASME's style, however.

7.5 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 [nodefaultsups].

7.6 Old-style Author Grid

The option [oldauthors] invokes ASME's old grid-style arrangement of author names. The authors and affiliations must be entered differently in this case. See Appendix B for usage.

7.7 Hyphenation of Typewriter Font

The option [hyphenate] will allow hyphenation of the typewriter font. Hyphenation is normally suppressed for typewriter mode because this font is often used for code.

7.8 Support for Other Languages

The package can be adapted to incorporate (or entirely use) languages other than English. See Appendix C for details.

8. CONCLUSION

Provide a brief conclusion (3-4 lines).

ACKNOWLEDGMENT

Place any acknowledgments here.

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TABLE 3: 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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APPENDIX A. THE VECTOR PRODUCT $\vec{A} \times \vec{B}$

This is just a brief illustration of an appendix, showing numbering of the appendix and equations. Equations are numbered consecutively, following those in the paper.

$$\frac{d\Gamma}{dt} = \int_{\mathcal{C}} \frac{D\mathbf{u}}{Dt} \cdot d\mathbf{r} \tag{4}$$

$$= \iint_{\mathcal{S}} \nabla \times \frac{D\mathbf{u}}{Dt} \cdot d\mathbf{A} \tag{5}$$

$$= \iint_{\mathcal{S}} \nabla p \times \nabla \left(\frac{1}{\rho}\right) \cdot d\mathbf{A} \tag{6}$$

APPENDIX B. OPTION TO USE AN AUTHOR GRID

ASME's most recent templates place author names inline, with affiliations for all authors in rows below. This style is the default for this template.

The historical style of authors with affiliation in a grid of blocks may be invoked with the option `[oldauthors]`. When using this form, the author names and addresses should be entered as below:

```
\SetAuthorBlock{Name\JointFirstAuthor}{%
                        Institution \\ City, State}
\SetAuthorBlock{Name\JointFirstAuthor}{%
                      Institution \\ City, Country}
\SetAuthorBlock{Name, Name}{%
                      Institution \\ City, Country}
\SetAuthorBlock{\CorrespondingAuthor{John Lienhard%
}{lienhard@mit.edu}}{Institution \\ City, State}
```

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 specified explicitly if a secondary language is loaded. 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", "Corresponding author", and "Joint first authors" by renewing the commands \keywordname, \nomname, \CAwords, and \JAwords. Changes to the page footer were described earlier. The pdf bookmark for "Appendices" may be changed by renewing \appendicesname.

Font encoding is set to T1 with utf-8 input supported: àáâäæãåā èéęëêēė îïíīįì ôöòóœøōõ 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, asmeconf.bst, is designed in English and aimed at BibTeX. Multilingual bibliographies can be supported using BibLaTeX.