Sample JASA Article

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Put your abstract here. Abstracts are limited to 200 words for regular articles and 100 words for Letters to the Editor. Please no personal pronouns, also please do not use the words "new" and/or "novel" in the abstract. An article usually includes an abstract, a concise summary of the work covered at length in the main body of the article.

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I. INTRODUCTION

This sample document demonstrates the use of JASA in manuscripts prepared for submission to the Journal of the Acoustical Society of America.

See JASA-TeXGuide.pdf, which is part of this package, for extensive documentation on using commands for JASA.

You can compare the .tex version of this file with the resulting .pdf version to give you an idea of what commands are available and how they work. At the top of the .tex file you'll find a listing of the documentclass options, and an explanation of their results. Some additional suggestions are included in the body of this manuscript.

Beginner Latex users should refer to their favorite online documentation. A useful place to start is the primer from the TeX Users Group https://www.tug.org/twg/mactex/tutorials/ltxprimer-1.0.pdf

EXAMPLE TEXT: This is example text. This is example text. This is example text. This is example text. This is example text. This is example text. This is example text. This is example text. This is example text. This is example text. This is example text. This is example text. This is example text. This is example text. This is example text. This is example text.

The paper is organized as follows: Section II presents initial information, while Section III presents examples of mathematical expressions.

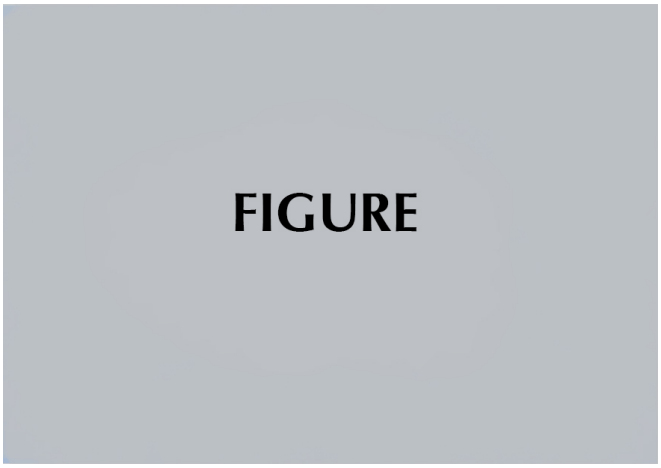


FIG. 1. Caption here.

Note: The only figure formats allowed are the following: .pdf, .ps, .eps, or .jpg. Figure files must be named in this fashion: Figure#.xxx, where "#" is the figure number and "xxx" is the file format (Figure1.eps, Figure2.jpg, Figure3a.ps, Figure3b.ps, etc).

[For these sample pages we have used only figsamp.jpg for convenience]

II. SECTION TWO

An example of another first-level Section with following example text that refers to subsections using `\ref{subsec:XXX}` ... EXAMPLE: Some background in section II and details in subsection II A.

A. Sample subsection

1. Sample subsubsection

a. Sample paragraph. Here is text following the paragraph heading. Here is a figure reference: is shown in Fig. 1.

III. INLINE AND DISPLAY MATH SAMPLES

A. Math and equations $\alpha\beta\Delta\Gamma$

Inline math may be typeset using the `$` delimiters. Bold math symbols may be achieved using the `bm` package and the `\bm{#1}` command it supplies. For instance, a bold α can be typeset as `$\bm{\alpha}$` giving $\boldsymbol{\alpha}$. Fraktur and Blackboard (or open face or double struck) characters should be typeset using the `\mathfrak{#1}` and `\mathbb{#1}` commands respectively. Both are supplied by the `amssymb` package which is called in JASA, so you don't need an `\usepackage{amssymb}` command in your .tex file. For example, `$\mathbb{R}$` gives $\mathbb{R}$ and `$\mathfrak{G}$` gives $\mathfrak{G}$.

In LaTeX there are many different ways to display equations; a few preferred ways are noted below. Displayed math will center by default.

Below we have numbered single-line equations; this is the most common type of equation.

$$\chi_+(p)[2|\mathbf{p}|(|\mathbf{p}|+p_z)]^{-1/2}\begin{pmatrix}|\mathbf{p}|+p_z\\ \\ px+ip_y\end{pmatrix}, \tag{1}$$

$$\left\{1234567890abc123\alpha\beta\gamma\delta1234556\alpha\beta\frac{1\sum_b^a}{A^2}\right\}. \tag{2}$$

Note the open one in Eq. (2).

Not all numbered equations will fit within a narrow column this way. The equation number will move down automatically if it cannot fit on the same line with a one-line equation.

$$\chi_+(p)[2|\mathbf{p}|(|\mathbf{p}|+p_z)]^{-1/2}\alpha\beta\gamma\delta123455678\alpha\beta\Gamma\Delta\frac{1\sum_b^a}{A^2}1234 \tag{3}$$

When the `\label{#1}` command is used [ie. input for Eq. (2)], the equation can be referred to in text without knowing the equation number that TEX will assign to it. Just use `\ref{#1}`, where `#1` is the same name that used in the `\label{#1}` command.

Unnumbered single-line equations can be typeset using the `\[`, `\]` format:

$$g^+g^+ \rightarrow g^+g^+g^+g^+ \dots \ , \quad q^+q^+ \rightarrow q^+g^+g^+ \dots \ .$$

Note the equations can be lettered with the subequations environment:

$$A = mc, \tag{4a}$$

$$B = mc^2, \tag{4b}$$

$$C \gtrsim mc^3. \tag{4c}$$

Referenced: Eqs. (4a), (4b), and (4c).

IV. FLOATS, FIGURES AND TABLES

Figures and tables are typically "floats" which means that their final position is determined by LATEX while the document is being typeset. LATEX isn't always successful in placing floats optimally. Use the figure* environment to get a wide figure that spans the page in a two-column layout.

A. Tables

Tables generally should be surrounded with `\begin{ruledtabular}...\end{ruledtabular}` This will guarantee that they are the width of the page or column, and have two ruled lines at the top and bottom of the table.

64 `[ht]` in the code below instructs LaTeX to place the table where it appears in type, if it
65 will fit on the page; otherwise put it on the top of the next page.

66 Footnotes in a table are labeled a, b, c, etc. They can be specified by using the LaTeX
67 `\footnotemark[]` and `\footnotetext[]` commands. The footnotes for a table are typeset
68 at the bottom of the table, rather than at the bottom of the page or at the end of the
69 references. The arguments for `\footnotemark[]` and `\footnotetext[]` should be numbers
70 1, 2, ... The journal style will convert these to letters.

71 This system allows multiple entries to refer to the same footnote.

TABLE I. A table with more columns still fits properly in a column. Note that several entries share the same footnote. Inspect the LaTeX input for this table to see exactly how it is done.

	r_c (Å)[a]	r_0 (Å)	κr_0		r_c (Å)	r_0 (Å)	κr_0
Cu	0.800	14.10	2.550	Sn[a]	0.680	1.870	3.700
Ag	0.990	15.90	2.710	Pb[b]	0.450	1.930	3.760

[a] Here's the first.

[b] Here's the second.

B. Plain Tables: When NOT to use 'ruledtabular'

There are a number of cases when 'ruledtablar' should not be used: basically for any table using complex content or commands.

1. *Using* `\multicolumn`

When you'd like to use the multicolumn command in your table, you'll find that 'ruledtabular' will cause bad formatting. In that case, Don't Use Ruledtabular, and instead put in `\hline\hline` at the top and bottom of the table.

TABLE II. A table made without 'ruledtabular' needs to have two hlines added to the top and bottom of the table.

	r_c (Å)[a]	r_0 (Å)	κr_0		r_c (Å)	r_0 (Å)	κr_0
Cu	0.800	14.10	2.550	Sn[a]	0.680	1.870	3.700
Ag	0.990	15.90	2.710	Pb[b]	0.450	1.930	3.760
Au	1.150	15.90	2.710	Ca[c]	0.750	2.170	3.560

[a] This is the first table note.

[b] This is the second table note.

[c] This is the third table note.

2. Using the `\adjustbox{} (tabular)\end{adjustbox}` *command*

There may be times when the table is too wide, or you want to have the table be the width of the page, whether or not it appears in preprint or reprint version of JASA. In this case you can use `\begin{adjustbox}{<width>} (tabular) \end{adjustbox}`. ('adjustbox' will NOT work with 'ruledtabular')

You can set a maximum width with

```
\begin{adjustbox}{max width=\textwidth}(tabular)\end{adjustbox}
```

in which case the table in the reprint version might be less than the full text width;

Or you can set the exact width you'd like with

```
\begin{adjustbox}{width=\textwidth}(tabular)\end{adjustbox}
```

in which case the table will be the full width of the page in either preprint or reprint.

This way you can make a table that will fit in the correct width whether you are using the preprint or reprint option.

TABLE III. Top 5 rated $\widehat{\text{ITD}}$ estimation methods according to the sum and product metric criteria for ±0.5 JND and ±1 JND tolerance thresholds (normalized scores).

Rank #	sum criteria [±0.5 JND]	sum criteria [±1 JND]	product criteria [±0.5 JND]	product criteria [±1 JND]
1	Threshold –30dB lp (0.43)	Threshold –30dB lp (0.71)	Threshold –30dB lp (1.00)	Threshold –30dB lp (1.00)
2	MaxIACCe lp (0.39)	Threshold –20dB lp (0.66)	MaxIACCe lp (0.39)	Threshold –20dB lp (0.57)
3	Threshold –20dB lp (0.38)	CenIACCr bb (0.62)	CenIACCr lp (0.33)	CenIACCr bb (0.37)
4	CenIACCr lp (0.37)	MaxIACCe lp (0.61)	Threshold –20dB lp (0.29)	MaxIACCe lp (0.34)
5	Cen-e^2 lp (0.34)	CenIACCe lp (0.61)	Cen-e^2 lp (0.10)	CenIACCr lp (0.33)

C. Using dcolumn

The call to `\usepackage{dcolumn}` is included in JASA.cls so you don't need to add it explicitly. http://anorien.csc.warwick.ac.uk/mirrors/CTAN/macros/latex/required/tools/dcolumn.pdf will give you detailed information. A gentler introduction may be found in this informative and well illustrated article: https://www.tug.org/pracjourn/2007-1/mori/mori.pdf, starting on page 20. (You may want to look at more examples in this quite comprehensive article on making tables in LaTeX.)

> "If we do not want to break the fractional and the integral part in two columns, the dcolumn package provides a new type of column
>
> `D{sep -in}{sep -out}{ before.after}`
>
> The first argument `{sep-in}` is the symbol used in the .tex document to separate the integral and the fractional part (usually the decimal point . or the decimal comma ,), the second argument `{sep-out}` is the symbol that we want in the output, the third is the number of digits on the left (before) and on the right (after) this symbol. The numbers are aligned to the decimal point and, in case that the third argument is negative, the decimal point is aligned to the center of the column. If the columns have a heading, it must be inserted into the command `\multicolumn{1}{c}{...}`

An example using dcolumn:

```
{\hsize= 2in
\begin{ruledtabular}
\begin{tabular}{cD {,}{.}{5.4}}
Expression           & \multicolumn {1}{c}{ Value }\\
\hline
$\pi$                  &      3,1416                  \\
$\pi^{\pi}$           &     36,46                    \\
$\pi^{\pi^{\pi}}$    & 80662,7                     \\
\end{tabular}
\end{ruledtabular}
}
```

Expression	Value
π	3.1416
π^{π}	36.46
$\pi^{\pi^{\pi}}$	80662.7

D. Sample Figures, new commands available in this style

Note that the publisher determines the final layout, so your choice of figure alignment may not be reflected in the published article.

`\figline{}` will center one or more figures on one line.

`\fig{<name of file>}{<width>}{<letter to put underneath>}`

`\leftfig{<name of file>}{<width>}{<letter to put underneath>}`

`\rightfig{<name of file>}{<width>}{<letter to put underneath>}`

`\boxedfig{<name of file>}{<width>}{<letter to put underneath>}`

`\rotatefig{<degrees of rotation>}{<name of file>}{<width>}`
`{<letter to put underneath>}`

The following illustrations show these commands in use.

```
\figline{\fig{figsamp.jpg}{4cm}{(a)}
\fig{figsamp.jpg}{4cm}{(b)}}
\figline{\fig{figsamp.jpg}{4cm}{(c)}
\fig{figsamp.jpg}{4cm}{(d)}}
\figline{\fig{figsamp.jpg}{4cm}{(e)}}
```

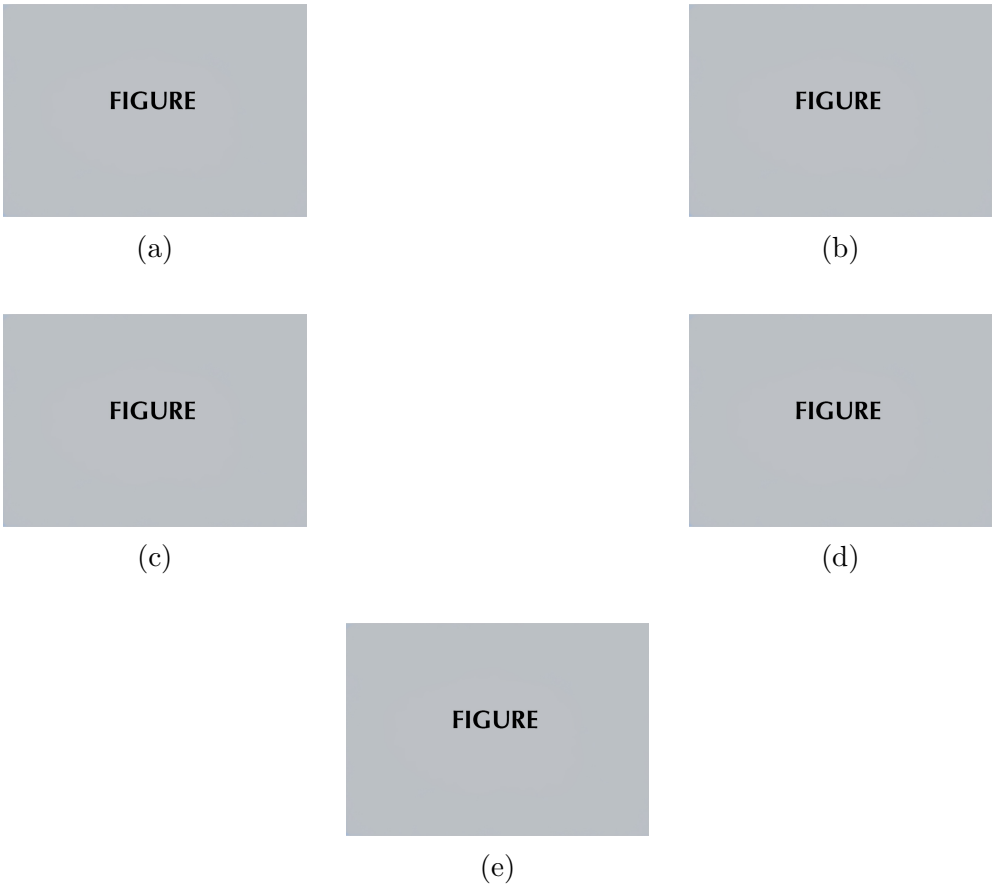


FIG. 2. Multiple images on one figure example (a) image 1, (b-f) (ρ=1000 kg/m^3) and speed of sound (c=1500 m/s).

```
\figline{\boxedfig{figsamp.jpg}{2in}{(a)}}
\figline{\leftfig{figsamp.jpg}{2in}{(b)}\rightfig{figsamp.jpg}{2in}{(c)}}
\figline{\rotatefig{90}{figsamp.jpg}{2in}{(d)}\rotatefig{180}{figsamp.jpg}{2in}{(e)}}
```

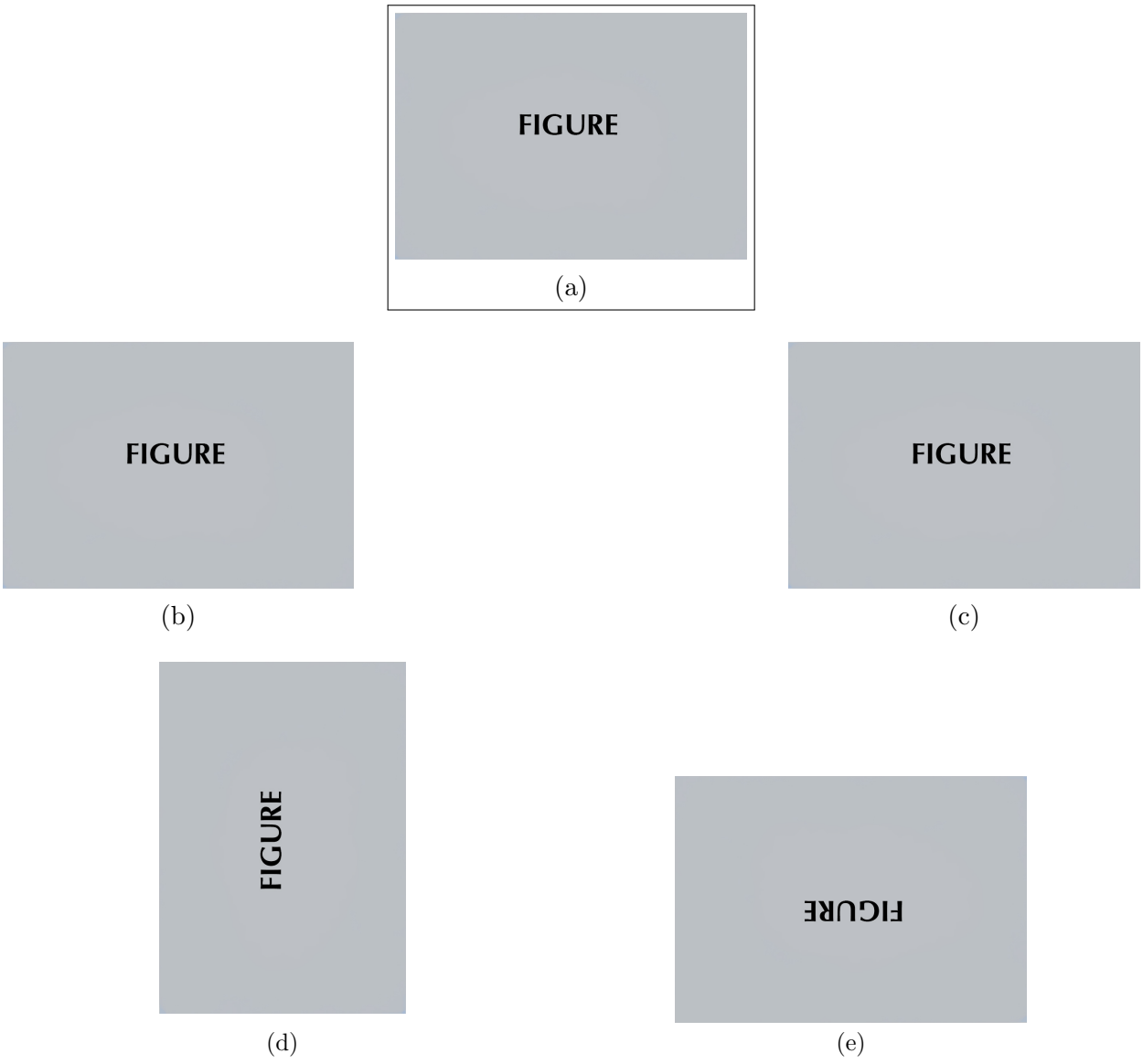


FIG. 3. More figure examples: (a) boxedfig, (b)leftfig; (c)right fig; (d) rotatefig 90 degrees; (e) rotatefig 180 degrees.

V. LABELS IN FIGLINE

We can label and reference separate parts of the figure when using figline. The reference will give the illustration letter as well as the figure number.

To label figures used in `\figline{}` type in your label immediately after the `\fig{}{}{}` command, inside the argument to figline. For example:

```
\figline{\fig{<name of file>}{<width>}{<letter to put underneath>}\label{<labelname>}}
```

The same placement should be used for all the kinds of fig environments used in `\figline{}`:

`\fig{}{}{}\label{}, \leftfig{}{}{}\label{}, \rightfig{}{}{}\label{},`
`\boxedfig{}{}{}\label{}, \rotatefig{}{}{}\label{}, \narrowcaption{}{}\label{}.`

```
\figline{\boxedfig{figsamp.jpg}{2in}{(a)}\label{boxedfigLetter}}
\figline{\leftfig{figsamp.jpg}{2in}{(b)}
\rightfig{figsamp.jpg}{2in}{(c)}\label{rightfigLetter}}
\figline{\rotatefig{90}{figsamp.jpg}{2in}{(d)}
\rotatefig{180}{figsamp.jpg}{2in}{(e)}\label{rotatefigLetter}}
```

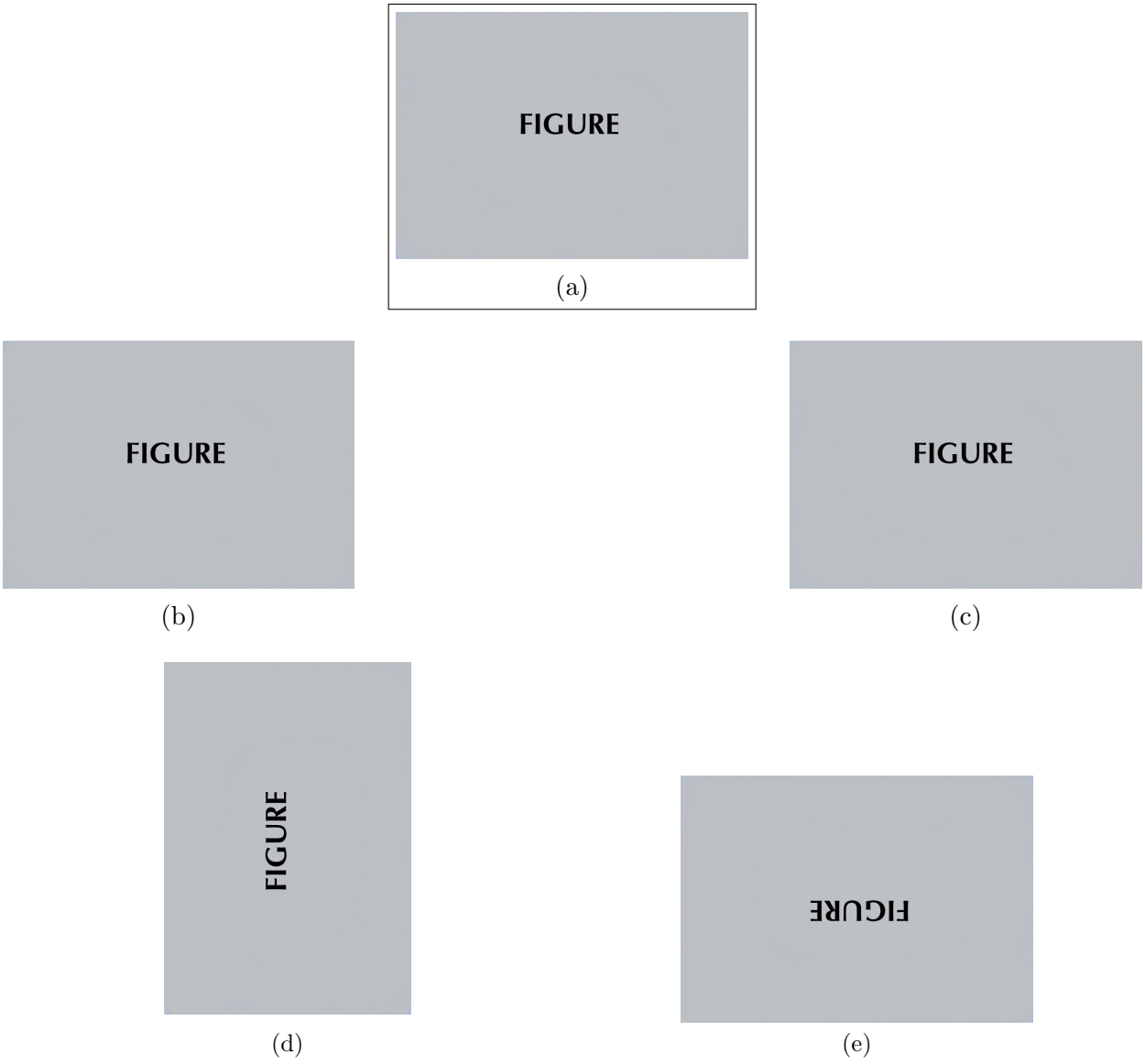


FIG. 4. More figure examples, showing how to enter `\label{}` command.

`References:\ref{boxedfigLetter},\ref{rightfigLetter},\ref{rotatefigLetter}`
which produces
References: 4(a),4(c),4(e)

```
\sidebysidefigures{figsamp.jpg}{Describing the first
illustration.}/{figsamp.jpg}{Describing the second illustration.}
```

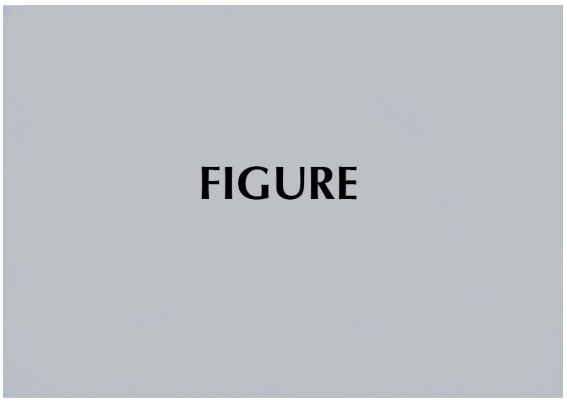


FIG. 5. Describing the first illustration.

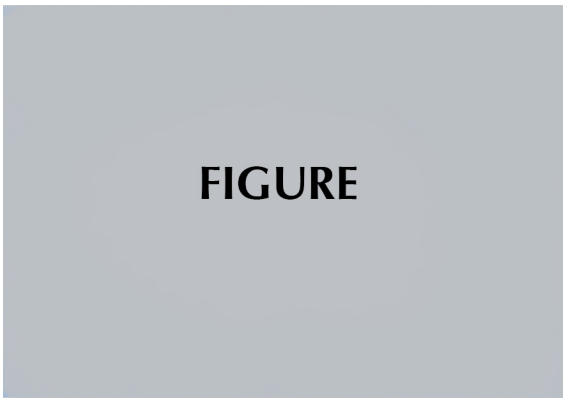


FIG. 6. Describing the second illustration.

```
\figline{
\fig{figsamp.jpg}{.7\textwidth}{}
\narrowcaption{.2\textwidth}{Here is a narrow caption.}
}
```

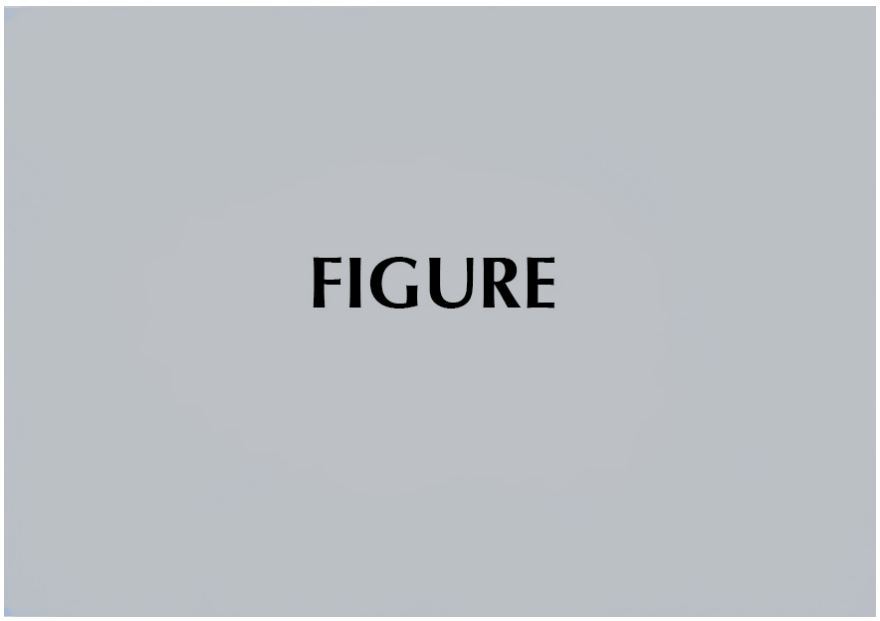
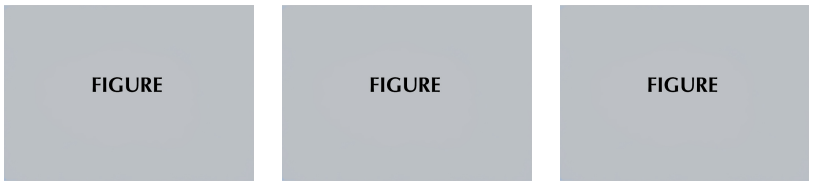


FIG. 7. Here is a narrow caption.

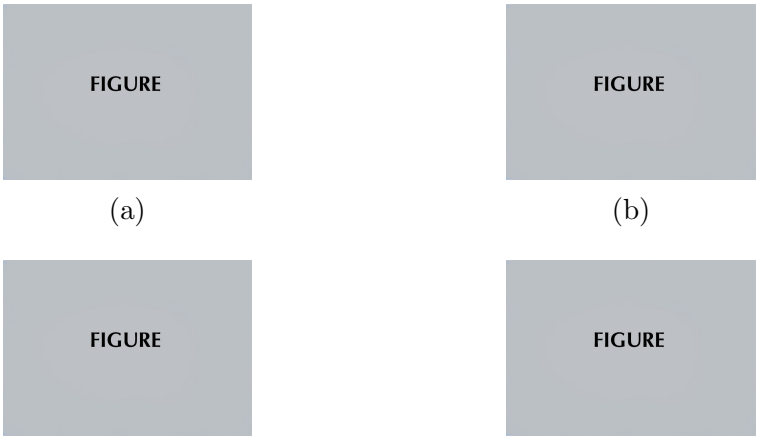
```
\figline{\fig{figsamp.jpg}{.2\textwidth}{(a)}
\fig{figsamp.jpg}{.2\textwidth}{(b)}
\fig{figsamp.jpg}{.2\textwidth}{(c)}
\narrowcaption{.25\textwidth}{Caption for three illustrations.
The caption may produce many lines, but only one paragraph.
}}
```



(a) (b) (c)

FIG. 8. Caption for three illustrations. The caption may produce many lines, but only one paragraph.

```
\vtop to 0pt{\vss
\figline{\leftfig{figsamp.jpg}{.2\textwidth}{(a)}
\leftfig{figsamp.jpg}{.2\textwidth}{(b)}\hfill}
\figline{\leftfig{figsamp.jpg}{.2\textwidth}{(c)}
\leftfig{figsamp.jpg}{.2\textwidth}{(d)}\hfill}
\vss}
\narrowcaption{.25\textwidth}{Here is a narrow caption that will can be
positioned to the right of four illustrations.
You cannot have more than one paragraph of text in a caption.
You cannot have more than one paragraph of text in a caption.
You cannot have more than one paragraph of text in a caption.
You cannot have more than one paragraph of text in a caption.
}
\vskip36pt % to give more space above the footline
```

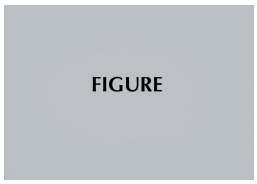


(a) (b)

(c) (d)

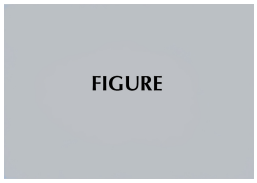
FIG. 9. Here is a narrow caption that will can be positioned to the right of four illustrations. You cannot have more than one paragraph of text in a caption. You cannot have more than one paragraph of text in a caption. You cannot have more than one paragraph of text in a caption. You cannot have more than one paragraph of text in a caption.

```
\figcolumn{
\fig{figsamp.jpg}{.2\textwidth}{(a)}
\fig{figsamp.jpg}{.2\textwidth}{(b)}
\fig{figsamp.jpg}{.2\textwidth}{(c)}
}
```



(a)

(b)



(c)

FIG. 10. Here are some stacking figures in a single column. The `\figcolumn{}` command works equally well in single or double column figures.

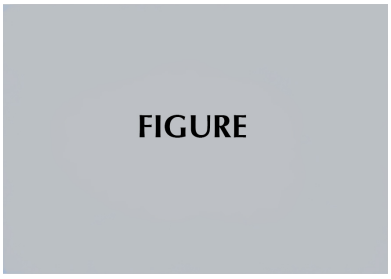


FIG. 11. Showing how you can have a caption that continues across pages or columns. This is a caption in a no float figure. It is designed to continue across columns or pages if it is particularly long. This is a caption that will continue across pages if necessary. This is a caption

that will continue across pages if necessary. This is a caption that will continue across pages if necessary. This is a caption that will continue across pages if necessary. This is a caption that will continue across pages if necessary. This is a caption that will continue across pages if necessary. This is a caption that will continue across pages if necessary. This is a caption that will continue across pages if necessary. This is a caption that will continue across pages if necessary. This is a caption that will continue across pages if necessary.

VI. ALGORITHM EXAMPLES

This example uses `\usepackage{algpseudocode}` as you see above. If you would rather use another algorithm package, please comment out this package (`%\usepackage{algpseudocode}`) and type in the package name that you'd like to use (but please check that the package is compatible with Editorial Manager; see JASA-EL-TeXGuide.pdf).

For other algorithm packages, see https://en.wikibooks.org/wiki/LaTeX/Algorithms

Here is an example of algorithmic:

if $i \geq maxval$ **then**
    $i \leftarrow 0$
else
    if $i + k \leq maxval$ **then**
        $i \leftarrow i + k$
    end if
end if

Documentation for the package is found at http://mirrors.rit.edu/CTAN/macros/latex/contrib/algorithm2e/doc/algorithm2e.pdf which shows many other examples and options.

A. Example of multimedia entry

Please note that this is for multimedia intended to appear inline within the published article.

Here is what a multimedia entry will look like:

Mm. 1. Corresponding pulse-compressed echo envelopes and video recordings from a fluttering luna moth. Echoes from the wings and body of the moth generally dominate the acoustic returns, which vary greatly over consecutive ensonifications across the wingbeat cycle. File of type "mp4" (15.3 MB)

Here we try cross referencing the multimedia entry: The multimedia above is Mm. 1.

B. Supplementary Material

ASA prefers that authors to submit related/relevant article files as supplementary material with their submission.

C. Supplementary material for publication

Any archival supplemental materials to be published with the manuscript (eg., supplementary figures) should be cited in-text and a footnote provided.

An example of reference to supplementary material:

The sound files and videos for this and other figures are included as supplementary materials[1].

The contents of the footnote above will appear at the beginning of the bibliography made with BibTeX when the default 'author-year' documentclass option is used; BibTeX output will have the footnote interleaved with other references if the NumberedRefs documentclass option is used.

D. File naming conventions

Here are the conventions for naming files:

- Supplementary Figure or Supplementary Figure or Text files should be named: SuppPub#.xxx, where "#" is a number and "xxx" is the file format extension (SuppPub1.docx, SuppPub2.jpg, etc)
- Supplementary Multimedia files: SuppPubmm#.xxx, where "#" is a number and "xxx" is the file format extension (SuppPubmm1.mp3, SuppPubmm2.gif, etc)
- Multimedia files must be named accordingly: MM#.xxx, where "#" is the number and "xxx" is the file format extension (MM1.wav, MM2.avi, etc).
- The only figure formats allowed are the following: .pdf, .ps, .eps, or .jpg. Figure files must be named in this fashion: Figure#.xxx, where "#" is the figure number and "xxx" is the file format (Figure1.eps, Figure2.jpg, Figure3a.ps, Figure3b.ps, etc).

VII. CONCLUSION

And in conclusion...

ACKNOWLEDGMENTS

This research was supported by ...

APPENDIX A:

To start the appendix, use the `\appendix` command. This signals that all following section commands refer to appendixes instead of regular sections. Therefore, the `\appendix` command should be used only once—to set up the section commands to act as appendices. Thereafter normal section commands are used. The heading for a section can be left empty. For example,

```
\appendix
\section{}
```

will produce an appendix heading that says "APPENDIX A" and

```
\appendix
\section{Background}
```

will produce an appendix heading that says "APPENDIX A: BACKGROUND" (note that the colon is set automatically).

If there is only one appendix, then the letter "A" should not appear. This is suppressed by using the star version of the appendix command (`\appendix*` in the place of `\appendix`).

APPENDIX B:

Observe that this appendix was started by using

```
\section{A little more on appendixes}
```

Note the equation number in an appendix:

$$E = mc^2. \tag{B1}$$

1. A subsection in an appendix

You can use a subsection or subsubsection in an appendix. Note the numbering: we are now in Appendix B 1.

a. A subsubsection in an appendix

Note the equation numbers in this appendix, produced with the subequations environment:

$$E = mc, \tag{B2a}$$

$$E = mc^2, \tag{B2b}$$

$$E \gtrsim mc^3. \tag{B2c}$$

They turn out to be Eqs. (B2a), (B2b), and (B2c).

APPENDIX C:

Figure and table numbering are continuous through the article, and handled the same as they are in the rest of the article.

FIG. 12. Figure in an appendix.

TABLE IV. Here is the caption for a table in an appendix.

one	two	three	four
C	D	E	F

1. Footnotes

The contents of the footnotes will appear at the beginning of the bibliography when BibTeX produces the .bbl file using the default AuthorYear style; interleaved with other references if NumberedRefs option:

```
\documentclass[preprint,NumberedRefs]{JASA}
```

and BibTeX has been used.

This example show where this cite (Hollman, 1997) will appear in the bibliography, depending on whether we use default author-year style or call for the NumberedRefs documentclass option.

Here are some sample footnotes:[2,3]

APPENDIX D:

Authors are highly recommended to use BibTeX to produce their bibliographies. The results will be predictable and even if it might take some time to get comfortable with using BibTeX, in the long run it will save you endless aggravation.

A resource for making your bibliography entries correctly is included in this package: JASA-ReferenceStyles.pdf. You will also find the files bibsamp1.tex/.pdf and bibsamp2.tex/.pdf for examples of output; and sampbib.bib for an example of how to make your .bib database entries.

There are two possible bibliography styles: the default, author-year, and the optional style, NumberedRefs, which you would call using

```
\documentclass[preprint,NumberedRefs]{JASA}
```

`\citep{}` should normally be used rather than `\cite{}`.

You can also use `\citet{}` if it is more grammatically correct to have only the year in parens (note: this is used with author-year style references).

```
\citep{bibitemName} = (bibitemName, year)
or
\citet{bibitemName} = bibitemName (year)
```

Note that the citations are hyperlinked to their entries in the bibliography:

Normal journal cite: (Christian *et al.*, 1984), Book reference Hollman (1997), Computer language documentation: (DISPERSE, 2001).

Every `\citep` or `\citet{}` will produce a citation and an entry in the bibliography. Every citation must have a matching entry in the bibliography database file (`\filename.bib`).

Make your bibliography by doing: pdflatex filename, bibtex filename, pdflatex filename, pdflatex filename.

Compare the results you get with

```
\documentclass[preprint]{JASA}
```

vs.

```
\documentclass[preprint,NumberedRefs]{JASA}
```

[1]See Supplementary materials at [URL will be inserted by AIP] for [give a brief description of the material].

[2]Here is the second footnote. It will appear before the beginning of the bibliography in Author-Year style (default) or it will be interleaved with other references when using the NumberedRefs option.

[3]Here is a third footnote.

Christian, R. S., Davies, R. E., Tubis, A. B., and Anderson, C. A. (**1984**). "Effects of air loading on tympani membrane vibrations," J. Acoust. Soc. Am. **76**, 1336–1345.

DISPERSE (**2001**). "A system for generating dispersion curves," User's Manual Version 2.0.16d, doi: 10.1177/1045389X16667559.

Hollman, J. P. (**1997**). *Heat Transfer*, 8th ed. (McGraw-Hill, New York), p. 55.