

## THE TITLE OF AN ARTICLE

DR. AUTHOR JONES

*At this Address*

This article illustrates many features of a mathematics article, but we do not explain the spurious appearance of the formula  $(\nabla \times F) \cdot k = z + 1$  in this abstract.

## 1 Sample Mathematics and Text

This short sample document illustrates the typeset appearance of in-line and displayed mathematics in documents. It also illustrates five levels of section headings and three kinds of lists. Finally, the document includes entries for a manual bibliography and an appendix.

## 1.1 In-line and Displayed Mathematics

The expression  $\sum_{i=1}^{\infty} a_i$  is in-line mathematics, while the numbered equation

$$\sum_{i=1}^{\infty} a_i \quad (1)$$

is displayed and automatically numbered as equation 1.

Let  $H$  be a Hilbert space,  $C$  be a closed bounded convex subset of  $H$ ,  $T$  a nonexpansive self map of  $C$ . Suppose that as  $n \rightarrow \infty$ ,  $a_{n,k} \rightarrow 0$  for each  $k$ , and  $\gamma_n = \sum_{k=0}^{\infty} (a_{n,k+1} - a_{n,k})^+ \rightarrow 0$ . Then for each  $x$  in  $C$ ,  $A_n x = \sum_{k=0}^{\infty} a_{n,k} T^k x$  converges weakly to a fixed point of  $T$ <sup>1</sup>.

Two sets of L<sup>A</sup>T<sub>E</sub>X parameters govern mathematical displays.<sup>a</sup> The spacing above and below a display depends on whether the lines above or below are short or long, as shown in the following examples.

A short line above:

$$x^2 + y^2 = z^2$$

and a short line below.

<sup>a</sup>L<sup>A</sup>T<sub>E</sub>X automatically selects the spacing depending on the surrounding line lengths.

A long line above may depend on your margins

$$\sin^2 \theta + \cos^2 \theta = 1$$

as will a long line below. This line is long enough to illustrate the spacing for mathematical displays, regardless of the margins.

## 1.2 Mathematics in section heads

$$\int_{\alpha}^{\beta} \ln t dt$$

Mathematics can appear in section heads. Note that mathematics in section heads may cause difficulties in typesetting styles with running headers or table of contents entries.

## 1.3 Theorems, Lemmata, and Other Theorem-like Environments

A number of theorem-like environments is available. The following lemma is a well-known fact on differentiation of asymptotic expansions of analytic functions.

**Lemma 1** *Let  $f(z)$  be an analytic function in  $\mathbb{C}_+$ . If  $f(z)$  admits the representation*

$$f(z) = a_0 + \frac{a_1}{z} + o\left(\frac{1}{z}\right),$$

for  $z \rightarrow \infty$  inside a cone  $\Gamma_{\varepsilon} = \{z \in \mathbb{C}_+ : 0 < \varepsilon \leq \arg z \leq \pi - \varepsilon\}$  then

$$a_1 = -\lim_{z \rightarrow \infty, z \in \Gamma_{\varepsilon}} z^2 f'(z), \quad (2)$$

**Proof.** Change  $z$  for  $1/z$ . Then  $\Gamma_{\varepsilon} \rightarrow \bar{\Gamma}_{\varepsilon} = \{z \in \mathbb{C}_- : \bar{z} \in \Gamma_{\varepsilon}\}$  and

$$f(1/z) = a_0 + a_1 z + o(z). \quad (3)$$

Fix  $z \in \bar{\Gamma}_{\varepsilon}$ , and let  $C_r(z) = \{\lambda \in \mathbb{C}_- : |\lambda - z| = r\}$  be a circle with radius  $r =$

$|z| \sin \varepsilon/2$ . It follows from (3) that

$$\begin{aligned} & \frac{1}{2\pi i} \int_{C_r(z)} \frac{f(\lambda) d\lambda}{(\lambda - z)^2} = \\ & \sum_{m=0}^1 a_m \frac{1}{2\pi i} \int_{C_r(z)} \frac{(\lambda - z_0)^m d\lambda}{(\lambda - z)^2} + R(z), \end{aligned} \quad (4)$$

where for the remainder  $R(z)$  we have

$$\begin{aligned} |R(z)| & \leq r^{-1} \max_{\lambda \in C_r(z)} o(|z|) \\ & = r^{-1} \max_{\lambda \in C_r(z)} |\lambda| \cdot O(|z| + r) \\ & = \frac{|z| + r}{r} \cdot O(|z| + r) \\ & = \frac{1 + \sin \varepsilon}{\sin \varepsilon} \cdot O(|z|). \end{aligned}$$

Therefore  $R(z) \rightarrow 0$  as  $z \rightarrow \infty$ ,  $z \in \bar{\Gamma}_{\varepsilon/2}$ , and hence by the Cauchy theorem (4) implies

$$\begin{aligned} \frac{d}{dz} f(1/z) & = a_1 + R(z) \rightarrow a_1, \\ & \text{as } z \rightarrow \infty, z \in \bar{\Gamma}_{\varepsilon/2}, \end{aligned}$$

that implies (2) by substituting  $1/z$  back for  $z$ . ■

## 2 Section Headings

Use the Section tag for major sections, such as the one just above. This typesetting specification provides only for the additional level of subsection, shown below.

### 2.1 Subsection Heading

This text appears under a subsection heading.

## 3 Lists

Bullet, numbered and description list environments are available. Lists, which can extend four levels deep, look like this:

1. Numbered list item 1.
2. Numbered list item 2.

- (a) A numbered list item under a list item.

The typeset appearance for this level is often different from the screen appearance. The typeset appearance often uses parentheses around the level indicator.

- (b) Another numbered list item under a list item.

- i. Third level numbered list item under a list item.

- A. Fourth and final level of numbered list items allowed.

- Bullet item 1.
- Bullet item 2.

– Second level bullet item.

\* Third level bullet item.

· Fourth and final level bullet item.

**Description List** Each description list item has a lead-in followed by the item. Double-click the lead-in box to enter or customize the text of the lead-in.

**Bunyip** Mythical beast of Australian Aboriginal legends.

## 4 Tags

You can apply the logical markup tag *Emphasized*.

You can apply the visual markup tags **Bold**, *Italics*, Roman, **Sans Serif**, *Slanted*, **SMALL CAPS**, and **Typewriter**.

You can apply the special, mathematics only, tags **BLACKBOARD BOLD**, *CALLIGRAPHIC*, and **fraktur**. Note that blackboard bold and calligraphic are correct only when applied to uppercase letters A through Z.

You can apply the size tags `tiny`, `scriptsize`, `footnotesize`, `small`, `normalsize`, `large`, `Large`, `LARGE`, `huge` and `Huge`.

This is a Body Math paragraph. Each time you press the Enter key, Scientific Work-Place switches to mathematics mode. This is convenient for carrying out “scratchpad” computations.

Following is a group of paragraphs marked as Short Quote. This environment is appropriate for a short quotation or a sequence of short quotations.

The only thing we have to fear is fear itself. *Franklin D. Roosevelt*, Mar. 4, 1933

Ask not what your country can do for you; ask what you can do for your country. *John F. Kennedy*, Jan. 20, 1961

There is nothing wrong with America that cannot be cured by what is right with America. *William J. “Bill” Clinton*, Jan. 21, 1993

## 5 About the Bibliography

Following the text of this article is a short manual bibliography. This sample bibliography has no relationship to the previous text, but it shows sample citations such as <sup>4</sup>, <sup>5</sup> and <sup>6</sup>. You can also have multiple citations appear together. Here is an example: <sup>2,3,4</sup>.

## References

1. N. Dunford and J. Schwartz, *Functional Analysis*, v. 2, John Wiley and Sons, New York, 1963.
2. Harstad, K. and Bellan, J., “Isolated fluid oxygen drop behavior in fluid hydrogen at rocket chamber pressures”, *Int. J. Heat Mass Transfer*, 1998a, **41**, 3537-3550
3. Harstad, K. and Bellan, J., “The Lewis number under supercritical conditions”, *Int. J. Heat Mass Transfer*, in print
4. Hirshfelder, J. O., Curtis, C. F. and Bird, R. B., *Molecular Theory of Gases and Liquids*, John Wiley and Sons, Inc., 1964
5. Prausnitz, J., Lichtenthaler, R. and de Azevedo, E., *Molecular thermodynamics for fluid-phase equilibrium*, Prentice-Hall, Inc., 1986
6. Reid, R. C., Prausnitz, J. M. and Polling, B. E., *The Properties of Gases and Liquids*, 4th Edition, McGraw-Hill Book Company, 1987

## Appendix

### A An Appendix

Because appendices may contain material that is supplementary rather than integral to the main text, many styles use a different numbering system for equations that appear in the appendices.

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad (5)$$

The quadratic equation shown as equation 5 is used to demonstrate how equations are numbered in the appendix.