Journal of Computational Mathematics
Vol. 00, Pages 000–000 (XXXX)

How to use the *SMAI-JCM* class file

THIERRY UNTEL [1]
JANE Q. DOE [2]

[1] Inria Sophia Antipolis Méditerranée, France
E-mail address: thierry.untel@inria.fr
[2] Department of Mathematics, University of Minnesota, Minneapolis, MN, USA
E-mail address: doe082@math.umn.edu.

Abstract. This document is a short user's guide to the LaTeX class for articles submitted to *SMAI-JCM*. The abstract should generally be kept short. Important: Do not use "personal" LaTeX macros in the abstract, since the text will be extracted for further processing.

Keywords. hypersingular integral, multigrid.
Math. classification. 65N35; 15A15.

1. Introduction

Articles may be divided into sections and subsections, like this one. Shorter articles may not need subsections, while longer articles can also use subsubsections, and even paragraphs and subparagraphs (which are unnumbered).

1.1. Preamble

Avoid overuse of macros, e.g., mere abbreviations, such as `\bt` to replace `\begin{theorem}`. The facilities of your editor can be used instead to minimize keystrokes. Intelligible comments explaining complex macros may be useful and are appreciated. Deviations from these guidelines may cause inaccuracies and delays in the publication.

Avoid overuse of macros. It is unnecessary to introduce abbreviations, such as `\bt` to replace `\begin{theorem}`. Instead, the facilities of your editor can be used instead to minimize keystrokes. Intelligible comments explaining complex macros may be useful and are appreciated. Deviations from these guidelines may cause inaccuracies and delays in the publication.

1.2. Header information

At the start of the paper, after invoking `\title`, `\author`, `\address`, etc., and entering the abstract between tags `\begin{abstract}` and `\end{abstract}`, invoke the `\maketitle` command to typeset this header information.

1.3. References

The bibliography must be built using bibtex. A sample of a bibtex file, `biblio.bib`, is included as part of this sample manuscript and is available on the journal website `https://ojs.math.cnrs.fr/index.php/SMAI-JCM`.

References are entered into the bibtex file as in the sample and then citations are made in the article text by using the `\cite` command. Here are examples of an article [3], a book [1], a PhD thesis [5], an unpublished paper [4], and a book section [2].

The first author was supported by the Inria project TEA.

2. **Figures**

Figures must be provided in PDF. The following commands illustrate how to include a figure in the text.

```
\begin{figure}[tbp]
\includegraphics[width=0.3\linewidth]{figure-msia.pdf}
\caption{Example of figure.}
\label{exfig}
\end{figure}
```

The width parameter, which is `0.3\linewidth` here, can be adjusted as needed, but should not exceed `1.0\linewidth`. See Figure 1 for an example. Subfigures can be used as well, as shown in Figure 2.

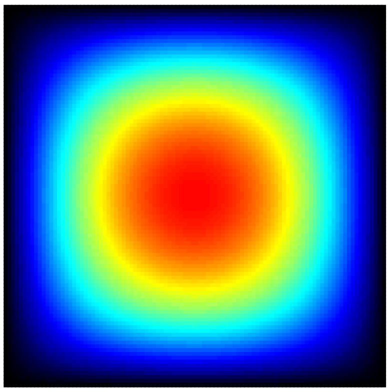
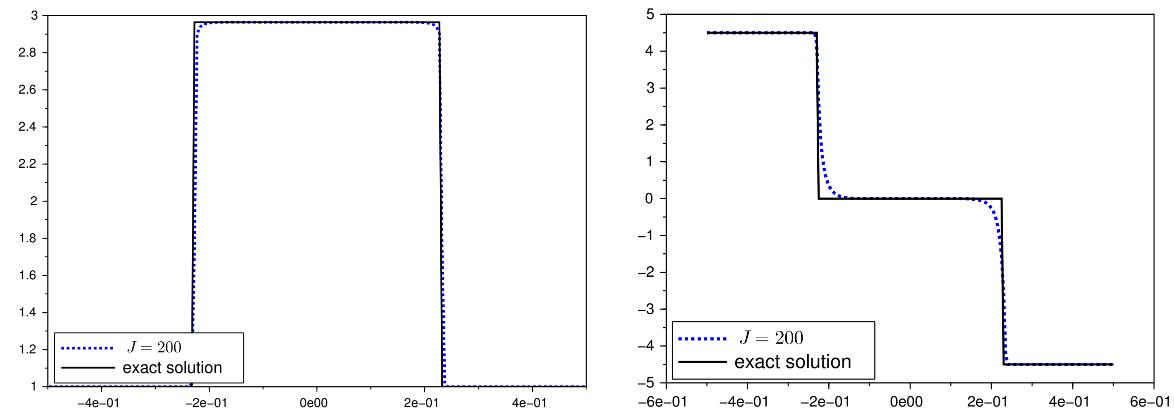


Figure 1. Example of figure.



(A) Volume fraction

(B) Velocity

Figure 2. Exact and numerical ($J = 200$, $\Delta t = 4.044\ 10^{-6}$) solution at $t = 1$ with $U = 4.5$

Besides figures in the text, SMAI-JCM allows for the possibility of publishing additional supplementary materials in various format, for example, animations. Contact the editors-in-chief if you would like to explore this possibility.

3. **Proclamation environments**

Environments are defined for theorems, lemmas, proofs, etc. These include `theorem`, `lemma`, `corollary`, `proposition`, `definition`, `remark`, `remarks`, `notation`, `example`, and `proof`.

Here is an example of a numbered equation, then a theorem, followed by the proof. We define degrees of freedom

$$\xi(u) = \int_e uq, \quad q \in \mathcal{P}_{r-2}(e), \quad e \in \Delta(T). \tag{3.1}$$

The following theorem establishes their unisolvence.

Theorem 3.1. *For any integers $r, n \geq 1$ and any n-simplex T, the degrees of freedom* (3.1) *are unisolvent on $V(T) = \mathcal{P}_r(T)$.*

Proof. It suffices to verify, first, that the number of degrees of freedom proposed for T does not exceed $\dim V(T)$, and, second, that if all the degrees of freedom vanish when applied to some $u \in V(T)$, then $u \equiv 0$.
For the first claim, we have note that the total number of degrees of freedom is at most

$$\sum_{d=0}^{n} \#\Delta_d(T) \dim \mathcal{P}_{r-d-1}(\mathbb{R}^d) = \sum_{d=0}^{n} \binom{n+1}{d+1}\binom{r-1}{d} = \binom{n+r}{n} = \dim \mathcal{P}_r(T).$$

The second claim can be established by induction on the dimension. ■

Illuminating examples and remarks make a paper more appealing.

Example 3.2. This is an example of an example.

Remark 3.3. The mathematics in this paper is just for illustration purposes. It is not intended to make sense.

Now consider a result like this one.

Lemma 3.4. *The energy content E of an object of rest mass m satisfies $E \leq 2mc^2$.*

If its proof is separated from the statement of the result we can use the `ProofOf` environment to tag the delayed proof.

Proof of Lemma 3.4. This follows from Einstein's mass–energy relation and the inequality $1 \leq 2$, whose proof is left to the reader. ■

Appendix A. **An appendex on appendices**

The paper can contain an appendex, for instance to detail a proof, or even multiple appendices.

Appendix B. **Further boring but useful stuffs**

Note that appendex sections have labels specific to that section.

$$E \geq 0.5mc^2. \tag{B.1}$$

Acknowledgements

We get by with a little help from our friends. (The `\thanks` tag in the header is used for acknowledging the support of institutions, this section for thanking persons.

Bibliography

[1] Vladimir I. Arnold. *Mathematical Methods of Classical Mechanics*. Springer-Verlag, New York, 1978.

[2] C. King and C.-L. Terng. Submanifolds in path space. In K. Uhlenbeck, editor, *Global Analysis in Modern Mathematics*, pages 253–282. Publish or Perish, Inc., Houston, 1993.

[3] J. Leray and J-L. Lions. Quelques résultats de Višik sur les problèmes elliptiques nonlinéaires par les méthodes de Minty-Browder. *Bull. Soc. Math. France*, 93:97–107, 1965.

[4] Y. Maday and D. J. Talay. How to use the *mathematics in actions* class file. `http://msia.cedram.org/telechargeable/cedram-msia.pdf`, 2008.

[5] M. Vajiac. *Gauge theory techniques in quantum cohomology*. PhD thesis, Boston University, 2000.