How to Prepare Manuscripts for the CODEE Journal Using LaTeX

Person One and Person Two
Institution A

Person Three
Institution B

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Abstract: This document describes how to prepare manuscripts for the *CODEE Journal* using LaTeX.

1 Introduction

The Community of Ordinary Differential Equations Educators (CODEE) exists to improve the teaching and learning of ordinary differential equations (ODEs), primarily by encouraging broader use of modeling projects and computer experiments. CODEE publishes an electronic journal containing learning materials relating to ODEs called the *CODEE Journal*. This journal is published online at the CODEE Digital Library, which is accessible at `http://www.codee.org`.

This document models how one might use the LaTeX document processing system to typeset manuscripts for publication in the *CODEE Journal*. It is recommended that authors download the source files for this document (including the CODEE Journal style file) and refer to the file `how-to-prepare-manuscripts.tex` while reading this document.

There are many wonderful print and online sources for information on the LaTeX document system. Two helpful books are the classic reference by Lamport [3] and the more recent book by Grätzer [2].

2 Typesetting Mathematics

2.1 Examples of Displayed Equations

If a ball is thrown upward from ground level with initial velocity v_0, then the position y of the ball above the ground at time t is given by the initial value problem

$$my'' = -mg - cy', \quad y(0) = 0, \quad y'(0) = v_0, \tag{2.1}$$

where m is the mass of the ball, g is the gravitational constant, and c is the positive drag constant. Here is an example of how to refer to equation (2.1) using the `\eqref` command.

Here is an example of a longer equation that must be wrapped across several lines.

$$\begin{aligned}\cos x + i \sin x &= \left(1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \cdots + \frac{(-1)^n x^{2n}}{(2n)!} + \cdots\right) \\ &\quad + i\left(x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots + \frac{(-1)^{n+1} x^{2n+1}}{(2n+1)!} + \cdots\right) \\ &= 1 + \frac{ix}{1!} + \frac{(ix)^2}{2!} + \frac{(ix)^3}{3!} + \cdots + \frac{(ix)^n}{n!} + \cdots = e^{ix}\end{aligned}$$

2.2 Systems of Differential Equations

As you will be writing about differential equations, you will probably find it necessary to typeset systems of differential equations. To do so, please use the `align` environment.

Here is an example.

$$x' = -ax + bxy - Hx \tag{2.2}$$
$$y' = cy - dxy - Hy \tag{2.3}$$

Here is the same example without equation numbers using the `align*` environment.

$$\begin{aligned}x' &= -ax + bxy - Hx \\ y' &= cy - dxy - Hy\end{aligned}$$

If you only want some of the equations to be numbered, use the `\notag` command.

$$\begin{aligned}x' &= -ax + bxy - Hx \\ y' &= cy - dxy - Hy\end{aligned} \tag{2.4}$$

Now we can just refer to differential equation for y as equation (2.4).

If you wish to number a whole set of equations with one equation number, use the `subequations` environment.

$$\frac{dw}{dt} = -aw \tag{2.5a}$$
$$\frac{dx}{dt} = aw - bx - cxy^2 \tag{2.5b}$$
$$\frac{dy}{dt} = bw - ky + cxy^2 \tag{2.5c}$$
$$\frac{dz}{dt} = ky \tag{2.5d}$$

Now we can refer to a specific equation (2.5a) or the whole system (2.5).

One can include initial conditions to the right of the differential equations by adding more alignment markers (&).

$$x' = -x + xy/10 - Hx, \qquad x(0) = 8 \tag{2.6}$$
$$y' = y - xy/5 - Hy, \qquad y(0) = 16 \tag{2.7}$$

2.3 Examples and Problems

If you would like to include sample problems or examples, you can use the `problems` or `example` environments to easily set these apart from the rest of your exposition.

Example 2.1. If a is a constant, the general solution to the linear differential equation $y'(t) = ay(t)$ is $y(t) = Ce^{at}$.

Problem 2.2 (A sample tedious problem). Find the general solution to the forced differential equation $y''(x)+y(x) = (x+1)^{20}\sin x$. You must use the undetermined coefficients method and you are not allowed to use any technology to help you find the answer.

Notice that the numbering of these problems and examples is automatic. Referring to them by this automatically-generated number is easy—for example, look at Problem 2.2.

2.4 Figures

The use of color graphics, images and other visual elements is strongly recommended. However, color graphics should be designed with appropriate contrast so that they can be rendered well on black and white printers. Vector art formats such as encapsulated PostScript (EPS) or Adobe Illustrator (AI) are preferred to raster art formats such as JPEG, GIF or TIFF. For more information, please see `http://en.wikipedia.org/wiki/Vector_art`. Figure 1 gives an extreme example of the difference between vector art and raster art.

If you use `pdflatex` to compile your document, your art will need to be converted to PDF format. All graphics files should be uploaded together with the manuscript during the submission process.

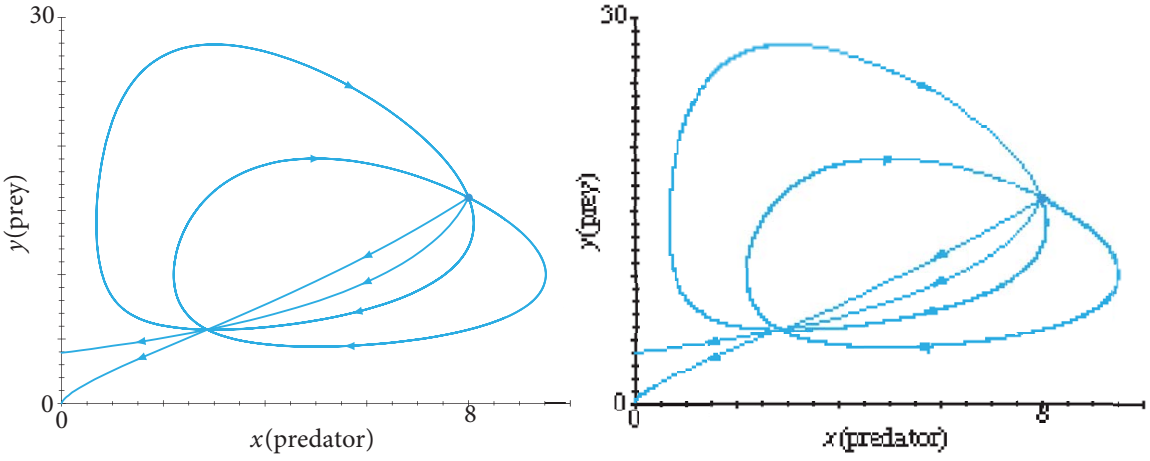

Figure 1: The figure on the right is a rasterized version of the figure on the left. Raster art files tend to appear pixelated and unattractive when the document is printed.

3 Citation Style

The *CODEE Journal* LaTeX style file uses the `natbib` package, which extends LaTeX's own reference citation commands. Authors should use a `.bib` file instead of the `\bibentry` command. Please refer to the file `how-to-prepare-manuscripts.bib` that accompanies this document.

Authors should use the `\citep` and `\citet` commands to produce parenthetical and textual citations, respectively. Here are some examples.

- The first paper published in the *CODEE Journal* was Borrelli and Coleman [1].
- There exist good books on the LaTeX document processing system [2, 3].
- Numerical methods can sometimes produce incorrect solutions to ODEs [1].

4 Hyperlinks

All content published by the *CODEE Journal* is designed to be as user-friendly as possible. Many users will interact with your manuscript directly through a PDF file viewer, so it is helpful if you can include links that will take users to helpful websites or even to launch a piece of software.

Use the `\url` command to add links to web pages. If you have a system of differential equations that you would like readers to explore using a numerical solver, consider using the free, cross-platform numerical solver program ODE Toolkit[1] to create a `.ode` file, which will allow users to interact with your differential equations without having to retype them into the computer.

Notice that the *CODEE Journal* style file uses the `hyperref` package to create links that help the reader more easily navigate through the PDF file using a PDF file viewer. For example, try clicking on the equation number in "equation (2.1)" in your PDF viewer. You should be taken back to the page containing that equation. The `hyperref` package also creates bookmarks from your `\section` and `\subsection` commands so that users can quickly jump to the appropriate parts of your manuscript.

5 Final Notes

If you have any questions about the preparation of your manuscript, please refer to CODEE's editorial policy[2]. The editorial policy describes the various kinds of manuscripts that are accepted by the *CODEE Journal*, the criteria will be used to review your manuscript, and the submission process.

Before you submit your manuscript, please review this list of questions.

1. Does the manuscript include all of the required elements as described in the editorial policy? Does it address all listed criteria for peer evaluation?

[1] http://odetoolkit.hmc.edu

[2] http://scholarship.claremont.edu/codee/policies.html

2. Is all bibliographic information complete and accurate?

3. Was a spell-checking program used to catch typographic errors?

4. Have all granting or support sources been properly acknowledged?

5. Is all text in any figures, plots or diagrams readable?

Thank you for submitting your work to the *CODEE Journal*. Your submission to the *CODEE Journal* adds to the growing body of materials on the teaching and learning of ordinary differential equations.

References

[1] Robert Borrelli and Courtney Coleman. Pitfalls and pluses in using numerical software to solve differential equations. *CODEE Journal*, 2009. URL http://www.codee.org/ref/PA09-0157.

[2] George Grätzer. *More Math Into LaTeX*. Springer, 4th edition, 2007.

[3] Leslie Lamport. *LATEX: A Document Preparation System*. Addison-Wesley Pub. Co., 1994.