Metodo del gradiente coniugato

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Sommario—Welcom to tau (τ) LaTeX class for making academic articles and lab reports. In this example template, we will guide you through the process of using and customizing this class to your needs. For more information of this class check out the appendix section. There, you will find snippets codes that define key aspects of the template, allowing you to explore and modify them.

keywords—*LaTeX class, lab report, academic article, tau class*

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1. Introduction

Welcome to *tau class* template for preparing your academic article or lab report. In this guide, we will take a look at its main features and how you can customize some aspects to this class. Due to its clean and structured code, users can easily customize this class to their specific needs and preferences. In addition, this template uses an easy-to-read and high quality font in equations with *stix2*. Notable features include custom colors, environments and settings for including code from Matlab, C, C++ and LaTeX, and .

2. Document styling

2.1. Title

The `\maketitle` command generates the title and author information section, including the professor name or other information, and affiliations. The title can be modified in *tau class* code in the *title style* section.

By default, *tau class* centers the title. However, you can change `\centering` to `\raggedright` in `\renewcommand{maketitle}` to move the title to the left or, modify it to your own preferences.

2.2. Abstract

The abstract and keywords are defined using the `\keywords` and `\begin{abstract}␣\end{abstract}` commands respectively. For the abstract to appear, make sure the `\taucontent` command is always included after the beginning of the document.

2.3. Table of contents

The *tau class* provides a table of contents. Each level of the ToC provides a preview of the content and its location in the document.

2.4. Tau start

We included the `\taustart{}` command, which provides a personalized lettrine for the beginning of a paragraph.

2.5. Caption

2.5.1. Figures

The provided `\captionsetup[figure]` command customizes the appearance of captions for figures in LaTeX documents. For example, in Fig. 1, shows an example figure.

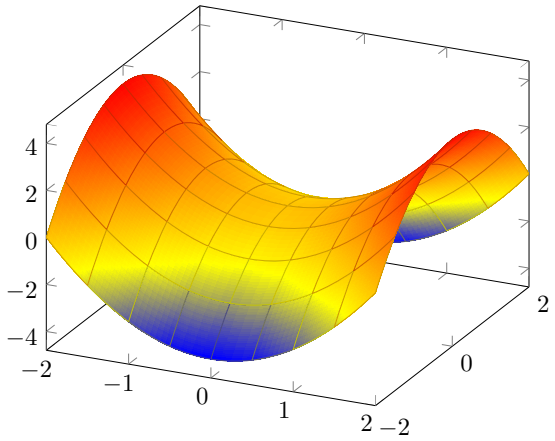

Figura 1. Example figure (obtained from *PGFPlots - A LaTeX package to create plots.* [Online]. Available: https://pgfplots.sourceforge.net/).

2.5.2. Tables

The `\captionsetup[table]` command customizes the appearance of the captions for tables in the document. The `\tabletext{}` is used to add notes to tables easily. Table 1, shows an example table.

Tabella 1. Small table example.

Column 1	Column 2
Data 1	Data 2
Data 3	Data 4

Note: I'm a table text for additional information.

2.6. Equation

Equation 1 shows an example equation.

$$\frac{\hbar^2}{2m}\nabla^2\Psi + V(\mathbf{r})\Psi = -i\hbar\frac{\partial\Psi}{\partial t} \tag{1}$$

The **amssymb** package was not necessary to include, because the stix2 font incorporates mathematical symbols for writing quality equations. In case you choose another font, uncomment the package in *tau class* code.

If you want to change the values that adjust the spacing above and below in the equations, go to *tau class-math packages* section and play with `\setlength{\eqskip}{6.5pt}` value until the preferred spacing is set. See appendix for more information.

3. Environment

The *tau class* includes custom environments designed to enhance the presentation of information within documents. Among these custom environments are **tauenv**, **info** and **note**.

Custom title

This is an example of the custom title environment. To add a title type `[frametitle=Custom title]` next to the beginning of the environment (as shown in this example).

One of the main features of the info and note environment is that they automatically change the language of their titles (currently English and Spanish).

4. Coding

Tau class includes the *listings* package, which offers versatile and customizable features for typesetting code snippets in LaTeX documents. Specifically for C, C++, LaTeX and Matlab codes.

For C and C++ codes, the *listings* package recognizes the syntax of these programming languages and highlights keywords, comments, and string literals accordingly.

```c
#include <stdio.h>

// Function to calculate the factorial
int factorial(int n) {
    // Base case: if n is 0 or 1, return 1
    if (n == 0 || n == 1)
        return 1;
    // Recursive case: return n times the factorial of (n-1)
    else
        return n * factorial(n - 1);
}

int main() {
    int num;
    printf("Enter a number to find its factorial: ");
    scanf("%d", &num);
    // Call the factorial function and print the result
    printf("Factorial of %d = %d\n", num, factorial(num));
    return 0;
}
```

Code 1. Example of C code.

Similarly, for Matlab codes, the *listings* package offers syntax highlighting and line numbering, to the MATLAB language syntax.

```matlab
function fibonacci_sequence(num_terms)
    % Initialize the first two terms of the sequence
    fib_sequence = [0, 1];

    if num_terms < 1
        disp('Number of terms should be greater than or equal to 1.');
        return;
    elseif num_terms == 1
        fprintf('Fibonacci Sequence:\n%d\n', fib_sequence(1));
        return;
    elseif num_terms == 2
        fprintf('Fibonacci Sequence:\n%d\n%d\n', fib_sequence(1), fib_sequence(2));
        return;
    end

    % Calculate and display the Fibonacci sequence
    for i = 3:num_terms
        fib_sequence(i) = fib_sequence(i-1) + fib_sequence(i-2);
    end

    fprintf('Fibonacci Sequence:\n');
    disp(fib_sequence);
end
```

Code 2. Example of matlab code.

5. References

The default formatting for references follows the IEEE style. This style is commonly used for technical documents, research papers, and scholarly articles in engineering fields [1].

At the end of the document, you will find an example of the default reference formatting [2].

6. Appendix

6.1. Environments preview

The following environments are defined in *tauenvs* package.

6.1.1. Tau environment

The following code defines the tauenv environment. A custom title can be added to this environment.

Tauenv

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed vestibulum justo quis massa aliquet, ut ultrices quam bibendum.

```
\newmdenv[
  backgroundcolor=taublue!22,
  linecolor=taublue,
  linewidth=0.7pt,
  frametitle=\vskip0pt\bfseries,
  frametitlerule=false,
  frametitlefont=\color{taublue}\bfseries\sffamily,
  frametitlealignment=\raggedright,
  innertopmargin=3pt,
  innerbottommargin=6pt,
  innerleftmargin=6pt,
  innerrightmargin=6pt,
  font=\selectfont,
  fontcolor=taublue,
  frametitleaboveskip=8pt,
  skipabove=10pt
]{tauenv}
```

Code 3. Tauenv environment code.

6.1.2. Note

This code defines the note environment.

Note

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed vestibulum justo quis massa aliquet, ut ultrices quam bibendum.

```
\newmdenv[
  backgroundcolor=taublue!22,
  linecolor=taublue,
  linewidth=0.7pt,
  frametitle=\vskip0pt\bfseries\notelanguage,
  frametitlerule=false,
  frametitlefont=\color{taublue}\bfseries\sffamily,
  frametitlealignment=\raggedright,
  innertopmargin=3pt,
  innerbottommargin=6pt,
  innerleftmargin=6pt,
  innerrightmargin=6pt,
  font=\normalfont,
  fontcolor=taublue,
  frametitleaboveskip=3pt,
  skipabove=10pt
]{note}
```

Code 4. Note environment code.

6.1.3. Info

This code defines the info environment.

Information

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed vestibulum justo quis massa aliquet, ut ultrices quam bibendum.

```
\newmdenv[
  backgroundcolor=taublue!22,
  linecolor=taublue,
  linewidth=0.7pt,
  frametitle=\vskip0pt\bfseries\infolanguage,
  frametitlerule=false,
  frametitlefont=\color{taublue}\bfseries\sffamily,
  frametitlealignment=\raggedright,
  innertopmargin=3pt,
  innerbottommargin=6pt,
  innerleftmargin=6pt,
  innerrightmargin=6pt,
  font=\normalfont,
  fontcolor=taublue,
  frametitleaboveskip=3pt,
  skipabove=10pt
]{info}
```

Code 5. Info environment code.

6.2. Alternative title

You can make the following modification to *tau class* in the *title preferences* section to change the position of the title. This will move the title to the left.

```
\renewcommand{\@maketitle}{%
        \vskip-18pt
    {\RaggedRight\bfseries\color{taublue}\fontsize
     {18}{22}\sffamily\selectfont\@title\par}
    \vskip8pt
    {\RaggedRight\normalsize\sffamily\@author\par}
        \vskip8pt
    {\RaggedRight\fontsize{7pt}{8pt}\selectfont\
     @professor\par}
        \vskip24pt
}%
```

Code 6. Alternative title.

6.3. Equation skip value

Play with the value of `\eqskip` until the preferred spacing is set for equations.

```
\newlength{\eqskip}\setlength{\eqskip}{6.5pt}
\expandafter\def\expandafter\normalsize\expandafter{%
    \normalsize%
    \setlength\abovedisplayskip{\eqskip}%
    \setlength\belowdisplayskip{\eqskip}%
    \setlength\abovedisplayshortskip{\eqskip-\
     baselineskip}%
    \setlength\belowdisplayshortskip{\eqskip}%
}
```

Code 7. Equation skip code.

Riferimenti bibliografici

[1] A. Einstein, «Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]», *Annalen der Physik*, vol. 322, n. 10, pp. 891–921, 1905. DOI: http://dx.doi.org/10.1002/andp.19053221004.

[2] P. A. M. Dirac, *The Principles of Quantum Mechanics* (International series of monographs on physics). Clarendon Press, 1981, ISBN: 9780198520115.