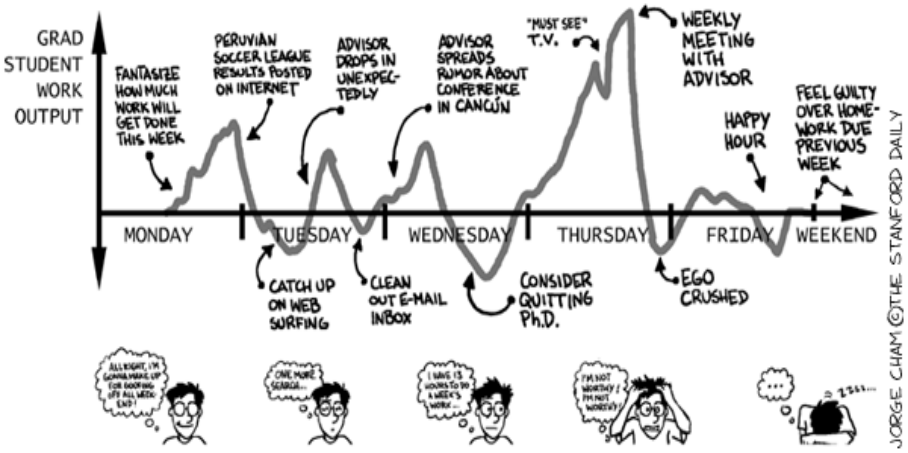
INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA

Área Departamental de Engenharia de Electrónica e Telecomunicações e de Computadores



[Título da dissertação, do Projecto ou do Relatório de Estágio]

[NOME COMPLETO DO AUTOR]

(Grau do candidato)

Dissertação para obtenção do Grau de Mestre
em Engenharia Informática

Orientadores : [Grau][Nome do orientador]
[Grau][Nome do orientador]

Júri:

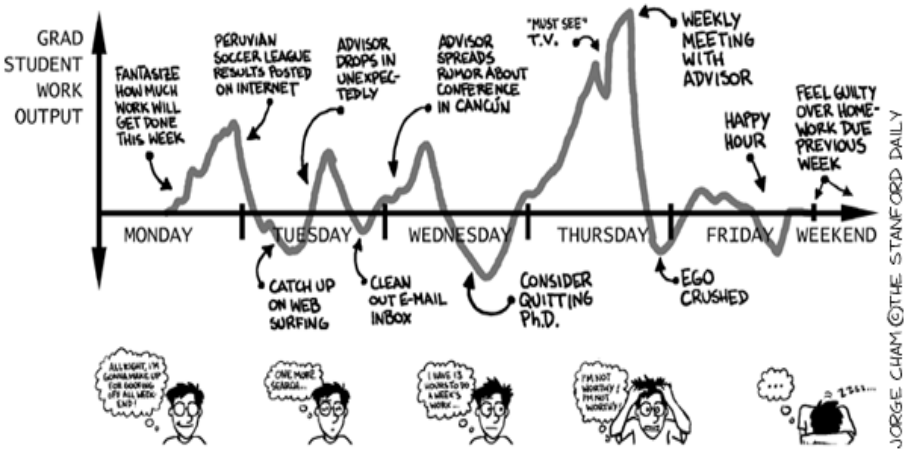
Presidente: [Grau e Nome do presidente do júri]

Vogais: [Grau e Nome do primeiro vogal]
[Grau e Nome do segundo vogal]
[Grau e Nome do terceiro vogal]
[Grau e Nome do quarto vogal]

MÊS, ANO

INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA

Área Departamental de Engenharia de Electrónica e Telecomunicações e de Computadores



[Título da dissertação, do Projecto ou do Relatório de Estágio]

[NOME COMPLETO DO AUTOR]

(Grau do candidato)

Dissertação para obtenção do Grau de Mestre
em Engenharia Informática

Orientadores : [Grau][Nome do orientador]
[Grau][Nome do orientador]

Júri:

Presidente: [Grau e Nome do presidente do júri]

Vogais: [Grau e Nome do primeiro vogal]
[Grau e Nome do segundo vogal]
[Grau e Nome do terceiro vogal]
[Grau e Nome do quarto vogal]

MÊS, ANO

Abstract

The dissertation must contain two versions of the abstract, one in the same language as the main text, another in a different language. The package assumes the two languages under consideration are always Portuguese and English.

The package will sort the abstracts in the proper order. This means the first abstract will be in the same language as the main text, followed by the abstract in the other language, and then followed by the main text.

The abstract is critical because many researchers will read only that part. Your abstract should provide an accurate and sufficiently detailed summary of your work so that readers will understand what you did, why you did it, what your findings are, and why your findings are useful and important. The abstract must be able to stand alone as an overview of your study that can be understood without reading the entire text. However, your abstract should not be overly detailed. For example, it does not need to include a detailed methods section.

Even though the abstract is one of the first parts of the document, it should be written last. You should write it soon after finishing the other chapters, while the rest of the manuscript is fresh in your mind.

The abstract should not contain bibliography citations, tables, charts or diagrams. Give preference to the use of the verbs in the third person singular. Time and word must not dissociate yourself within the abstract. Abbreviations should be limited. Abbreviations that are defined in the abstract will need to be defined again at first use in the main text.

Finally, you must avoid the use of expressions such as "The present work deals with ... ", "In this thesis are discussed .... ", "The document concludes that .... ", "apparently and .... " etc.

The word limit should be observed, 300 words is the limit.

Abstracts are usually followed by a list of keywords selected by the author. Choosing appropriate keywords is important, because these are used for indexing purposes. Well-chosen keywords enable your manuscript to be more easily identified and cited.

Keywords: Keywords (in English) . . .

Resumo

Independentemente da língua em que está escrita a dissertação, é necessário um resumo na língua do texto principal e um resumo noutra língua. Assume-se que as duas línguas em questão serão sempre o Português e o Inglês.

O *template* colocará automaticamente em primeiro lugar o resumo na língua do texto principal e depois o resumo na outra língua. Por exemplo, se a dissertação está escrita em Português, primeiro aparecerá o resumo em Português, depois em Inglês, seguido do texto principal em Português.

Resumo é a versão precisa, sintética e selectiva do texto do documento, destacando os elementos de maior importância. O resumo possibilita a maior divulgação da tese e sua indexação em bases de dados.

A redação deve ser feita com frases curtas e objectivas, organizadas de acordo com a estrutura do trabalho, dando destaque a cada uma das partes abordadas, assim apresentadas: Introdução - Informar, em poucas palavras, o contexto em que o trabalho se insere, sintetizando a problemática estudada. Objetivo - Deve ser explicitado claramente. Métodos - Destacar os procedimentos metodológicos adoptados. Resultados - Destacar os mais relevantes para os objetivos pretendidos. Os trabalhos de natureza quantitativa devem apresentar resultados numéricos, assim como seu significado estatístico. Conclusões - Destacar as conclusões mais relevantes, os estudos adicionais recomendados e os pontos positivos e negativos que poderão influir no conhecimento.

O resumo não deve conter citações bibliográficas, tabelas, quadros, esquemas. Dar preferência ao uso dos verbos na 3ª pessoa do singular. Tempo e verbo não devem dissociar-se dentro do resumo. Deve evitar o uso de abreviaturas e siglas - quando absolutamente necessário, citá-las entre parênteses e precedidas da explicação de seu significado, na primeira vez em que aparecem.

E, deve-se evitar o uso de expressões como "O presente trabalho trata ...", "Nesta tese são discutidos....", "O documento conclui que....", "aparentemente é...."etc.

Existe um limite de palavras, 300 palavras é o limite.

Para indexação da tese nas bases de dados e catálogos de bibliotecas devem ser apontados pelo autor as palavras-chave que identifiquem os assuntos nela tratados. Estes permitirão a recuperação da tese quando da busca da literatura publicada.

Palavras-chave: Palavras-chave (em português) . . .

Contents

1 Introduction **1**

1.1 Introduction 3

1.2 Folder Structure 3

1.3 Package Options 4

1.3.1 Language Related Options 4

1.3.2 Class of Text 5

1.3.3 Printing 5

1.3.4 Font Size 6

1.3.5 Text Encoding 6

1.3.6 Examples 6

1.4 How to Write Using LaTeX 6

2 A Short LaTeX Tutorial with Examples **7**

2.1 Document Structure 8

2.2 Dealing with Bibliography 8

2.3 Inserting Tables 8

2.4 Importing Images 8

2.5 Floats, Figures and Captions 8

2.5.1 Inserting Figures Wrapped with text 8

2.6 Text Formatting 9

2.7 Generating PDFs from LaTeX 9
2.7.1 Generating PDFs with pdflatex 9
2.7.2 Dealing with Images 9
2.7.3 Creating Source Files Compatible with both latex and pdflatex 10
2.8 Equações 14

A Appendix 1 **i**

List of Figures

2.1 Vectorial image 8
2.2 Subfigure example with vectorial and no-vectorial images 13

List of Tables

2.1 Table's rules. 12

Listings

2.1 Wrapfig example 8
2.2 R-Code (Test). 14

1

Introduction

A margin-par note!

This package is distributed under GPLv3 License. If you have questions or doubts concerning the guarantees, rights and duties of those who use packages under GPLv3 License, please read http://www.gnu.org/licenses/gpl.html.

A a note in a line by itself.

Please note that

this package and template are not official for ISEL/IPL.

ThesisISEL User's Manual

1.1 Introduction

This chapter describes how to use the LaTeX style thesis. This style file is a major rewrite from the most of Universities, which was in turn adapted from a style file from the FCT-UNL (not official version). We aimed at providing an improved visual layout and, simultaneously, a *very easy to use* template (aka, a LaTeX template for dummies).

The first main rule you must know is that **you must** specify the encoding of your text files. A simple *rule of thumb* is: if you are using Windows add 'latin1' to the list of package options; if you are using other systems, such as Linux or Mac OSx, add 'utf8' to the list of package options.

1.2 Folder Structure

The template file for writing dissertations in LaTeX is organized into a main directory, a set of files and sub-directories:

ThesisISEL This is the main directory and includes:

Logo Directory with Faculty logos;

r-files Directory with useful bash scripts, e.g., for cleaning all temporary files;

Chapters Directory where to put user files (text and figures);

alpha-pt.bst A file with bibliography names in portuguese, e.g., 'Relatório Técnico' e 'Tese de Mestrado' instead of 'Technical Report' and 'Master Thesis'. This file is used automatically if Portuguese is selected as the main language (see below);

defaults.tex A file with the main default values for the package (institution name, faculty's logo, degree name and similars);

template.tex The main file. You should run `LaTeX` in this one. Please refrain from changing the file content outside of the well defined area;

bibliography.bib The bib file. An easy way to find to import citation into `bibtex` is select option `Show links to import citation into BibTex` in `Scholar google settings`.

thesisisel.cls The `LaTeX` class file for the thesis style. Currently, some of the defaults are stored here instead of `defaults.tex`. This file should not be changed, unless you're ready to play with fire! :)

Again, we would like to recall that all the user `LaTeX` files should be stored in the `ThesisISEL` directory, and all the images in `ThesisISEL/Chapters/img` directory.

Yet another note!

1.3 Package Options

The thesis style includes the following options, that must be included in the options list in the `\documentclass[options]{thesisisel}` line at the top of the `template.tex` file.

The list below aggregates related options in a single item. For each list, the default value is prefixed with a *.

1.3.1 Language Related Options

You must choose the main language for the document. The available options are:

1. ***pt** — The text is written in Portuguese (with a small abstract in English).
2. **en** — The text is written in English (with a small abstract in Portuguese).

The language option affects:

- **The order of the summaries.** At first the abstract in the main language and then in the foreign language. This means that if your main language for the document in english, you will see first the abstract (in english) and then the 'resumo' (in portuguese). If you switch the main language for the document, it will also automatically switch the order of the summaries.
- **The names for document sectioning.** E.g., 'Chapter' vs. 'Capítulo', 'Table of Contents' vs. 'Índice', 'Figure' vs. 'Figura', etc.
- **The type of documents in the bibliography.** E.g., 'Technical Report' vs. 'Relatório Técnico', 'MSc Thesis' vs. 'Tese de Mestrado', etc.

No mater which language you chose, you will always have the appropriate hyphenation rules according to the language at that point. You always get portuguese hyphenation rules in the 'Resumo', english hyphenation rules in the 'Abstract', and then the main language hyphenation rules for the rest of the document. If you need to force hyphenation write inside of `\hyphenation{}` the hyphenated word, e.g. `\hyphenation{op-ti-cal net-works}`.

1.3.2 Class of Text

You must choose the class of text for the document. The available options are:

1. **bsc** — BSc graduation report.
2. **prepmsc** — Preparation of MSc dissertation. This is a preliminary report graduate students at ISEL/IPL must prepare to conclude the first semester of the two-semesters MSc work. The files specified by `\dedicatoryfile` and `\acknowledgmentsfile` are ignored, even if present, for this class of document.
3. **msc** — MSc dissertation.

1.3.3 Printing

You must choose how your document will be printed. The available options are:

1. **oneside** — Single side page printing.
2. ***twoside** — Double sided page printing.

1.3.4 Font Size

You must select the encoding for your text. The available options are:

1. **11pt** — Eleven (11) points font size.
2. ***12pt** — Twelve (12) points font size. You should really stick to 12pt...

1.3.5 Text Encoding

You must choose the font size for your document. The available options are:

1. **latin1** — Use Latin-1 (ISO 8859-1) encoding. Most probably you should use this option if you use Windows;
2. **utf8** — Use UTF8 encoding. Most probably you should use this option if you are not using Windows.

1.3.6 Examples

Let's have a look at a couple of examples:

- Preparation of MSc thesis, in portuguese, with 12pt size and to be printed one sided (I wonder why one would do this!)
  `\documentclass[prepmsc,pt,12pt,oneside,latin1]{thesisisel}`
- MSc dissertation, in english, with 12pt size and to be printed double sided
  `\documentclass[msc,en,12pt,twoside,utf8]{thesisisel}`

1.4 How to Write Using LaTeX

Please have a look at Chapter 2, where you may find many examples of LaTeX constructs, such as Sectioning, inserting Figures and Tables, writing Equations, Theorems and algorithms, exhibit code listings, etc.

2

A Short LaTeX Tutorial with Examples

This Chapter aims at exemplifying how to do common stuff with LaTeX. We also show some stuff which is not that common! ;)

Please, use these examples as a starting point, but you should always consider using the *Big Oracle* (aka, Google, your best friend) to search for additional information or alternative ways for achieving similar results.

2.1 Document Structure

2.2 Dealing with Bibliography

2.3 Inserting Tables

2.4 Importing Images

2.5 Floats, Figures and Captions

2.5.1 Inserting Figures Wrapped with text

You should only use this feature is *really* necessary. This means, you have a very small image, that will look lonely just with text above and below.

In this case, you must use the `wrapfigure` package. To use `wrapfig`, you must first add this to the preamble:

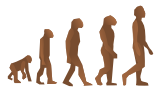


Figure 2.1: Vectorial image

`\usepackage{wrapfig}`

This then gives you access to:

`\begin{wrapfigure}[lineheight]{alignment}{width}`

Alignment can normally be either 'l' for left, or 'r' for right. Lowercase 'l' or 'r' forces the figure to start precisely where specified (and may cause it to run over page breaks), while capital 'L' or 'R' allows the figure to float. If you defined your document as twosided, the alignment can also be 'i' for inside or 'o' for outside, as well as 'I' or 'O'. The width is obviously the width of the figure. The example above was introduced with:

```
1  \begin{wrapfigure}{l}{2.5cm}
2    \centering
3      \includegraphics[width=2cm]{evolution_steps-vectorial}
4    \caption{Vectorial image}
5  \end{wrapfigure}
```

Listing 2.1: Wrapfig example

2.6 Text Formatting

2.7 Generating PDFs from LaTeX

2.7.1 Generating PDFs with pdflatex

You may create PDF files either by using `latex` to generate a DVI file, and then use one of the many DVI-2-PDF converters, such as `dvipdfm`.

Alternatively, you may use `pdflatex`, which will immediately generate a PDF with no intermediate DVI or PS files. In some systems, such as Apple, PDF is already the default format for `LaTeX`. I strongly recommend you to use this approach, unless you have a very good argument to go for `latex` + `dvipdfm`.

A typical pass for a document with figures, cross-references and a bibliography would be:

```
$ pdflatex template
$ bibtex template
$ pdflatex template
$ pdflatex template
```

You will notice that there is a new PDF file in the working directory called `template.pdf`. Simple :)

Please note that, to be sure all table of contents, cross-references and bibliography citations are up-to-date, you must run `latex` once, then `bibtex`, and then `latex` twice.

2.7.2 Dealing with Images

You may process the same source files with both `latex` or `pdflatex`. But, if your text include images, you must be careful. `latex` and `pdflatex` accept images in different (exclusive) formats. For `latex` you may use EPS ou PS figures. For `pdflatex` you may use JPG, PNG or PDF figures. I strongly recommend you to use PDF figures in vectorial format (do not use bitmap images unless you have no other choice).

2.7.3 Creating Source Files Compatible with both latex and pdflatex

Do not include the extension of the file in the `\includegraphics` command. E.g., use
`\includegraphics{evolution_steps}`
and not
`\includegraphics{evolution_steps.png}`.
If you use the first form, `latex` or `pdflatex` will add an appropriate file extension.

This means that, if you plan to use only `pdflatex`, you need only to keep (preferably) a PDF version of all the images. If you plan to use also `latex`, then you also need an EPS version of each image.

To be included in the sections above

If you are writing only one or two documents and aren't planning on writing more on the same subject for a long time, maybe you don't want to waste time creating a database of references you are never going to use. In this case you should consider using the basic and simple bibliography support that is embedded within LaTeX.

LaTeX provides an environment called **thebibliography** that you have to use where you want the bibliography; that usually means at the very end of your document, just before the `\end{document}` command. Here is a practical example:

```
\begin{thebibliography}{9}

\bibitem{lamport94}
  Leslie Lamport,
  \emph{\LaTeX: A Document Preparation System}.
  Addison Wesley, Massachusetts,
  2nd Edition,
  1994.

\end{thebibliography}
```

To actually cite a given document is *very* easy. Go to the point where you want the citation to appear, and use the following: `\cite{citekey}`, where the citekey is that of the bibitem you wish to cite, e.g `~\cite{lamport94}`. When LaTeX processes the document, the citation will be cross-referenced with the bibitems and replaced with the appropriate number citation. The advantage here, once again, is that LaTeX looks after the numbering for you.

When a sequence of multiple citations are needed, you should use a single `\cite{}` command. The citations are then separated by commas. Note that you must not use spaces between the citations. Here's an result example [**? ? ?**].

Footnotes are a very useful way of providing extra information to the reader. Usually, it is non-essential information which can be placed at the bottom of the page. This keeps the main body of text concise.

The footnote facility is easy to use: `\footnote{Simple footnote}`[1].

[1] Simple footnote

The tabular environment can be used to typeset tables with optional horizontal and vertical lines. LaTeX determines the width of the columns automatically. The first line of the environment has the form: `\begin{tabular}[pos]{table spec}`

table spec tells LaTeX the alignment to be used in each column and the vertical lines to insert.

pos can be used to specify the vertical position of the table relative to the baseline of the surrounding text.

The number of columns does not need to be specified as it is inferred by looking at the number of arguments provided. It is also possible to add vertical lines between the columns here.

Some notes are important to followed, such as present in Table 2.1:

i) Not defined vertical lines;

ii) The legend must be on top;

iii) Use `\toprule`, `\midrule` and `\bottomrule` to draw horizontal lines.

Table 2.1: Table's rules.

Item		
Animal	Description	Price ($)
Gnat	per gram	13.65
	each	0.01
Gnu	stuffed	92.50
Emu	stuffed	33.33
Armadillo	frozen	8.99

There are two ways to incorporate images into your LaTeX document, and both use the graphicx package by means of putting the command `\usepackage{graphicx}` near the top of the LaTeX file, just after the documentclass command.

The two methods are

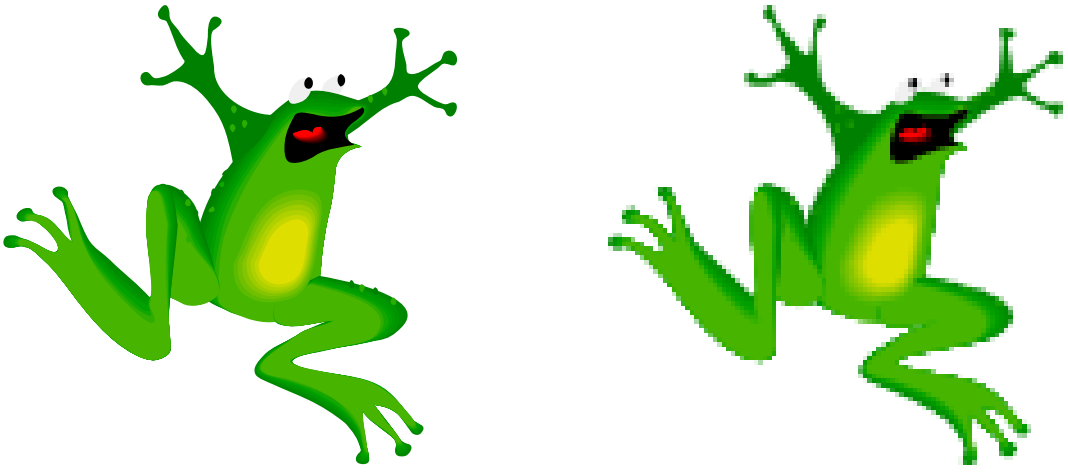
- include only PostScript images (esp. 'Encapsulated PostScript') if your goal is a PostScript document using dvips;
- include only PDF, PNG, JPEG and GIF images if your goal is a PDF document using pdflatex, TeXShop, or other PDF-oriented compiler.

Some PNG images within my LaTeX document. The quality of the image files is sufficient and the result using LaTeX and viewing the resulting DVI file is quite looks good.

To get the best quality of the images in PDF files I'd recommend using vector-based graphics for images. The best format to save images in is .pdf, see Figure 2.2(a). With programs like Inkscape, you can draw as you would in MS Paint (and do much more), and because the images are vector-based instead of pixel-based, their quality should be preserved when converting to PDF in any way.

In all cases, each image must be in an individual 1-image file; no animation files or multipage documents.

There are two different ways to place two figures/tables side-by-side. The subfigure package provides functionality to arrange figures and tables next to each other, within the usual figure-floating-environment. Subfigure will alphabetically number your subfigures and you have access to the complete reference as usual through `\ref{fig:subfig1}`, Figure 2.2, or to the letter only through `\subref{fig:subfig1}`, (a), or either `\ref{fig:ra-raster}`, Figure 2.2(b).



(a) Vectorial (b) Raster

Figure 2.2: Subfigure example with vectorial and no-vectorial images

Using the package listings you can add non-formatted text as you would do with `\begin{verbatim}` but its main aim is to include the source code of any programming language within your document. If you wish to include pseudocode or algorithms see LaTeX/Algorithms_ and_Pseudocode, as Listing 2.2.

```
# comment
square <- function(x) {
    x^2
    % x^2
}

# nerv
x <- c(1:100)
y <- square(x)
```

Listing 2.2: R-Code (Test).

2.8 Equations

Typesetting mathematics is one of LaTeX's greatest strengths. It is also a large topic due to the existence of so much mathematical notation. It is recommend to read the following document available in Short Math Guide for LaTeX - AMS - American Mathematical Society.

Writing by Matilde Pós-de-Mina Pato with collaboration of Nuno Datia, 2012 October

Appendix 1

There are two basic approaches to the numerical approximation of solutions of differential equations. One is to represent an approximate solution by the sum of a finite number of independent functions, for example the first terms of an expansion in orthogonal functions. The second approach, the one we are going to use in this work, is the difference method. This solution is approximated by its value at a sequence of discrete points called the mesh points. We will assume that these points are equally spaced and call them $t_i = ih$, where h is the spacing between adjacent points, and $i \in \mathbb{N}$. However, the mesh spacing, or step size h, will be seen affect the error introduced. A difference method is also called a step-by-step method and provides a rule for computing the approximation at step i to $y(t_i)$ in terms of the values of $y(t_{i-1})$ and possibly preceding points. We will call this approximation y_i. The difference methods, also called discrete variable methods, are generally more suited for the automatic computation of general nonlinear problems, and are the methods most frequently used in common computer subroutines libraries. When we think of approximating a solution numerically, we naturally are concerned with how accurate we can make the numerical solution to the actual solution. Since as h decreases the number of points and hence the amount of calculation increases, we would expect the effect of round-off errors to increase because there are more of them. Therefore, in defining convergence, we must require that the computation indicated in the method be performed exactly. In practice, this means that additional digits are carried in the computations as h decreases.

We previously assured ourselves that the problem was well-posed so that the effect of errors are bounded. We also need to know that the small changes in initial values only produce bounded canges in the numerical approximations provided by the method - stability. We see that stability is related to a method as well-posed is related to a problem, which is different from convergence. The concepts of stability and convergence are concerned with the limiting process as $h \to 0$. In practice, we must compute with a finite number of steps, we want to know if the errors we introduce at each step have a small or large effect on the answer.

For our two nonlinear ordinary differential equations (ODEs), two nonlinear ordinary differential equations (ODEs). In this appendix we only describe the algorithm for the dynamics of activation as approximation the 2nd-order Runge-Kutta method, the procedure of the contraction stretch ratio is equivalent, due this method is explicit. Regarding the backward Euler (implicit and unconditionally stable) method, we only describe the algorithm for the contraction stretch ratio, since for the dynamic activation is easier to apply.

The time-dependent activation process involves the contractile element and is caused by neural excitation. It is represented at the macroscopic level by the first-ODE:

$$\dot{\alpha}(t) = \frac{1}{\tau_{\text{rise}}} \left(1 - \alpha(t)\right) u(t) + \frac{1}{\tau_{\text{fall}}} \left(\alpha_{\min} - \alpha(t)\right) \left(1 - u(t)\right)$$

. In this equation the τ_{rise} and τ_{fall} are characteristic time constants for activation and deactivation of the muscle, and $\alpha_{\min}$ is the minimum value of activation. The function $u(t)$ ranges from 0 to 1, and represents the neural excitation, and is the input data for the model. We consider the value of the $u_{\max}$, the maximum neural excitation imposed. The activation $\alpha(t)$ ranges from $\alpha_{\min} \geqslant 0$ to 1. The error tolerance for iterative solver is defined by TOL.

Second order Runge-Kutta method - Mathematica 6.0 implementation

input: Time constants: τ_{rise} and τ_{fall}, minimum value of activation: $\alpha_{\min}$ and neural excitation: $u(t)$. For the explicit method we consider $h = 5 \times 10^{-4}$, $\gamma = 1$ and $TOL = 1 \times 10^{-6}$.
output: Activation: $\alpha(t) \in [\alpha_{\min}, 1]$

```
1  BETA=1-GAMMA
```

```
2  ETA=1/(2*GAMMA)
3  u=0.D00
4  ALPHA=ALPHA_{min}

Obtain the ALPHA(u,t_{i+1})

5  X[1]=ALPHA[1]
6   Do
7      t[i+1]=t[i]+h

Obtain the neural excitation in each time u[i]

8       If t.LEQ.t_{min)
9          Then
10             u[i]=0
11         Elseif t.LEQ.t_{max}
12             Then
13                 u[i]=u_{max}
14             Else
15                 u[i]=0
16      End
17     q_1=X[i]+ETA*h*NEWALPHA(X[i],u(t[i]))
18     X[i+1]=X[i]+BETA*h*NEWALPHA(X[i],u(t[i]))+GAMMA*h*NEWALPHA(q_1
19      If ((X[i+1]-X[i]).LEQ.TOL)
20         Then

Take ALPHA[i]=X[i+1] and iteration is stopped

21  ALPHA[i]=X[i+1]
22              Break[ ]
23         End
24      ALPHA[i]=X[i+1]
25  End
26 Return ALPHA
27 End
```

Since the contractile stretch ratio, $\dot{\lambda}^{\mathrm{CE}}$ is defined by:

$$\dot{\lambda}^{\mathrm{CE}}(\lambda_f, \lambda^{\mathrm{CE}}, \alpha, \dot{\lambda}_f, u) = f_V^{\mathrm{CE}^{-1}}\left(\lambda_f, \lambda^{\mathrm{CE}}, \alpha, \dot{\lambda}_f, u\right).$$

To evaluate the value of λ^{CE}, we need to know which is $alpha(u,u)$ and fibre stretch λ_f.

Implicit Euler method - Fortran implementation

input: Activation: α and the force-length curve f_L^{CE}. For the implicit method we consider $h = 5 \times 10^{-4}$, and $TOL = 1 \times 10^{-6}$.
output: Contractile stretch: λ^{CE}

```
1   API=ACOS(-1.D00)

Evaluate the denominator, where FLCE and NEWALPHA are
function in Fortran

2   DEN=FLCE()*NEWALPHA()
3   Goto 122
4   ICONV=0
5   If (ABS(DEN).GT.EPSILON(1.0D00))
6           Then
7               RESOLD=0.0D00
8               Do
9                  IT = 1,400

Evaluate the residuo and the corresponding derivative
function

10                 RES=RESIDUO(ALCEN)
11                 If (abs(RES).LEQ.TOL)
12                      Then
13                           ICONV=1
14                           Exit
15                 Endif
16                 DRES=DRESIDUO(ALCEN)
17                 If IT.NEQ.1
18                     Then
19                         RESOLD=RES
20                         STEPOLD=0.0D00
21                         Do
22                            JT=0,2
23                            STEPN=0.5D00^(-4)
24                            ALCEN=ALCEN-(STEPN-STEPOLD)*RESOLD/DRES
25                            STEPOLD=STEPN
```

```
26                              RES=RESIDUO(ALCEN)
27                              IF (RES.LEQ.0.99D00*RESOLD)
28                                  Then
29                                   Exit
30                              Endif
31                           Enddo
32       Else
33            ALCEN=ALCEN-RES/DRES
34       Endif
35    Enddo
36  Endif
37 122 Continue
38 If (abs(DEN).GEQ.EPSILON(1.0D00))
39     Then
40       Call BISSN(0.7D00,1.4D00,ALCE,TOL,IFE)
41       ALCEN=ALCE
42     Else
43        Call derivlambdaf
```

The variable L correspond to the fibre stretch

```
44         ALCEN=L
45  Endif
46  ALCENEW=ALCEN
47  Return
48  End
```