Poster generation with LaTeX

A Sample Study

Károly Erdei

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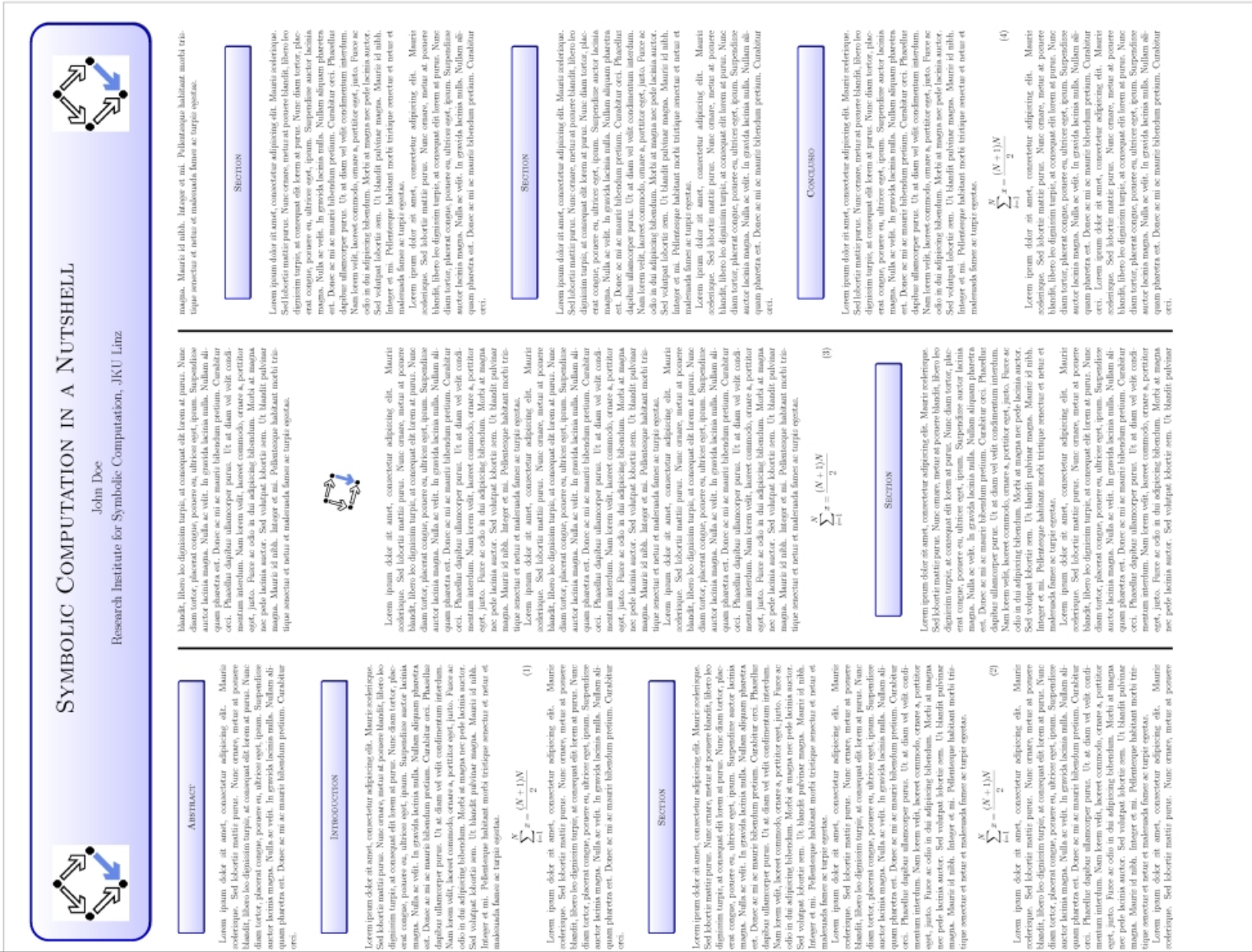
The Test Poster

made in RISC



2nd Sample Poster

GK Nichtlinearität und Nichtgleichgewicht in kondensierter Materie

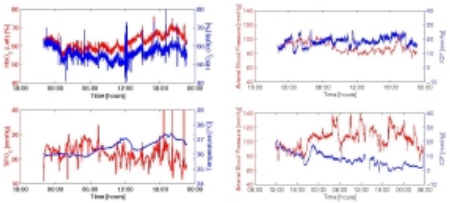
Andreas Jung – A mathematical model of the hydrodynamical processes in the brain

About the Author

- Diploma in May 2000 in Braunschweig at Prof. Weidelt (Geophysics)
- Kollegiat of the Graduiertenkolleg since December 2000
- Activities in the Graduiertenkolleg:
  - Speaker of the Kollegiaten from October 2001 to September 2002
  - Organization of the internal evaluation of the Graduiertenkolleg
  - Organization of projects for the student parabolic flight campaign from the european space agency (ESA). Projects: Granular material and Boomerangs in Zero-G

Introduction & Motivation

Multivariate data from patients with severe head injury on the intensive care unit at the University Hospital Regensburg – Department Neurosurgery.



Goal is the improvement of the treatment. Statistical data analysis can help to:

- understand the data and **reveal** the underlying system
- **determine** the state of health
- if possible, **predict** the future...

With time series analysis and independent component analysis (ICA) one obtains limited results. Solution: **design of a model** for this system.

Cooperations in the GK

A close cooperation in developing the model has been established with the group of **Prof. Brawanski** of the Department of Neurosurgery at the University Hospital of Regensburg. Especially with Rupert Faltermeier for the physical part of the model and providing the data and Ralf Rothörl, who is a physician at the neurosurgery department.

In the group of **Prof. Richter**, I had very fruitful discussions about the theoretical issues of the model with Juan-Diego Urbina and Peter Schlagheck as well as with

Illustrations

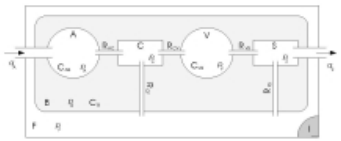
Two main fluid circulations exist in the brain:
blood & **cerebrospinal fluid**

Blood supply to the brain via the **arteries**, the outflow of the blood via the **venous blood vessels** and the cerebrospinal fluid (CSF) surrounding the brain tissue – production, circulation and absorption of CSF:

Model & Nonlinear Elements

Using a 7 compartment model:
A=arterial, **C**=capillary, **V**=venous, **S**=sinus,
B=brain tissue, **F**=fluid, **I**=injection of fluid.

A hydrodynamical model of the processes in the brain (an analog electric circuit, which is often more "intuitive" for physicists, can be devoped in the same way).



Basic equation: "**conservation of mass**"

$$\sum_i q_i = \frac{dm}{dt} = V\frac{d\rho}{dt}\bigg|_{V=\text{const}} + \rho\frac{dV}{dt}\bigg|_{\rho=\text{const}} \quad \text{since} \quad m(t) = \rho(t)\cdot V(t)$$

Modeling the nonlinear "Elements":

Autoregulation is a feedback mechanism to ensure constant bloodflow (R_{AC}, C_{AB}), **CSF-Circulation** needs diodes (R_{CF}, R_{FS}), **Veins** have a particular capacity (C_{VB}) and the **Brain tissue** is compressible (C_B)

Differential Equations & Solutions:

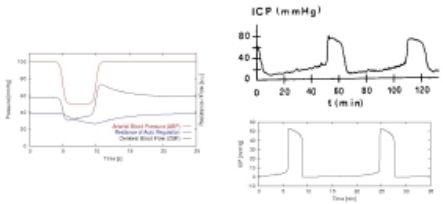
For the simplest model we obtain **two** differential equations plus **one** constrain:

$$\dot{p}_B = \frac{1}{C_{AB}+C_B}\left(\frac{p_C-p_B}{R_{CB}} - \frac{p_B-p_S}{R_{BS}} + q_I + C_{AB}\cdot\dot{p}_A\right)$$

$$\dot{R}_{AC} = \frac{1}{\tau_{AC}}\left(R_{AC,\text{opt}}(p_A-p_C) - R_{AC}\right)$$

$$\frac{p_A-p_C}{R_{AC}} - \frac{p_C-p_B}{R_{CB}} - \frac{p_C-p_S}{R_{CS}} = 0$$

The dynamical behaviour of the system (numerical results) shows the following well known clinical phenomena: **Autoregulation** & **ICP plateau waves** (Measurement [Ursino and Lodi, 1997] and Simulation)



Outlook

"**Standard** analysis" of the nonlinear differential equations and their behaviour:

- which numerical solutions do we obtain ?
- do the fix points change to limit cycles, when parameters change ?
- will the system reach chaos ?

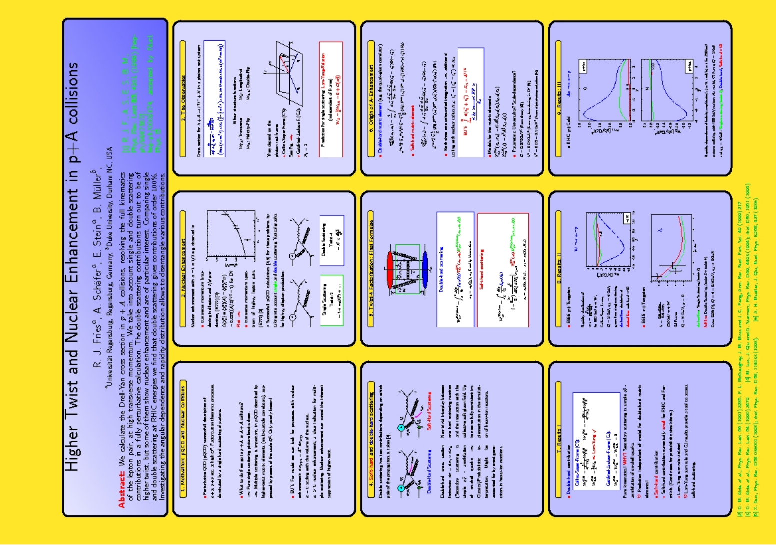
"**Stability** analysis": Stability of the fixpoints and their **parameter dependence** – most important for clinical applications!

→ Can we determine the **state of health** of the patient ?

Furthermore, is it possible to...

- **couple** the oxygen-level (I_{NVOS} and L_{IEOX}) to the model ?
- can we treat **local behaviour** with this model ?

3rd Sample Poster



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LaTeX-Posters

Designing Posters

Designing posters is a little bit tricky in LaTeX

- make usage of package `a0poster`
- `a0poster` is a documentclass like `article`
- acutally it is based on article
- Options
  - landscape
  - portrait
  - a0b, a0, a1, a2, a3 (sizes)
- you can include text, graphics, pictures, tables, etc.
- You can use minipages for positioning of your content.
- You can use full LaTeX coding
- You can not use `pdflatex`, you have to use latex, dvips, ps2pdf

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Sample Poster - Structure of Poster

risc-sample-poster.tex

Structure of the template

- The poster consists of two areas
  - the Header Block, with their subparts
  - the Content Block, the real content of the poster

The Header Block

- consist of three areas:
  - the left logo; the right logo
  - the title area with the three title lines
- makes use of `minipage`

The Content Block

- is structured in three columns
- continuous area with section headers
- makes use of `minipage` and the `multicol` -environments

Sample Poster

New commands/environments

New commands/environments used to create the poster structure

- New command `posterheader` for the Header Block of the poster
- New environment `pcolumn` for block settings
- New command `pbox` for size and color settings
- New command `sectionheading` for header lines of the sections in the Content Block
- New command `backgroud` for color settings in the Content Block
- New environment `poster` for the Content Block

General used LaTeX environment

- the minipage environment

Sample Poster

General settings

Used LaTeX packages

```
\documentclass[portrait,a0b,final]{a0poster}
\usepackage{pstricks,pst-grad}
\usepackage{ragged2e}
\usepackage{multicol}
```

The pstricks package features

- it has its own environment, pspicture, with drawing commands different from those of the picture environment.
- PSTricks is a set of macros (i.e. commands)
  - allows to include PostScript drawings directly inside TeX or LaTeX code.
  - commands: psline, pscircle, pscurve, etc.
- pdflatex cannot compile the commands of the pstricks package
- you have to use: `latex` | `dvips` | `ps2pdf`

Sample Poster

The pst-grad, multicol and regged2e packages

pst-grad package features

- provides a gradient fill style for arbitrary shapes.

multicol package features

- implements multiple columns of text (up to 10) in the multicol environment
- balances the length of the final columns for a nice appearance
- permits both single- and multicolumn formats on the same page
- places footnotes across the bottom of the page

The ragged2e package features

- The package redefines standard LaTeX justification commands and allows their modification by the user

Sample Poster

The LaTeX minipage environment

The Minipage environment has four parameters

- minipage [align][height][align]{width}
- alignment: [c|t|b]: c-center, t-top, b-bottom
- 1st alignment:
  - box to the neighbouring boxes, vertical alignment
- 2nd alignment:
  - content of box in the box, vertical alignment

The Latex newenvironment has three parameters

- newenvironment {name}{action-at-begin}{action-at-end}

```
\newenvironment{pcolumn}[1]
 { \begin{minipage}{#1\textwidth}
   \begin{center}
 }
 { \end{center}
   \end{minipage}
 }
```

Sample Poster

Creation of the Header Block

The pcolumn environment

- defines a centered minipage environment
- it's only parameter sets the width of the minipage
- used only to create the header box of the poster

The pbox command

```
\newcommand{\pbox}[4]{
        \psshadowbox[#3]{
        \begin{minipage}[t][#2][t]{#1} #4   \end{minipage}   }   }
```

- defines a minipage with four parameters
- two parameters set the height and the width of the minipage
- one parameter sets misc values for the psshadowbox command
- the fourth parameter is the `content` of the minipage
- used in two places:
  - in the poster header box and in the section header boxes

Sample Poster

The posterheader command

The posterheader command

```
\newcommand*{\posterheader}[3] {
   \begin{center}
   \begin{pcolumn}{0.98}
   \pbox{0.95\textwidth} {} {linewidth=2mm,...}
  {
%-- this is the #4 parameter, the content of the pbox, begins here  --
%   here is the code which generates the left logo, the three title lin
%   and the right logo.

  .......... a lot of latex code .......

  }
\end{pcolumn}
\end{center}
}
```

- Check the source code for more details.

Sample Poster - Content Block

New commands

The background new command

- it will be used to set the background for the Content Block area
- the colors are set to white at the invocation, no effect !

The newenvironment poster

```
\newenvironment{poster}
  { \begin{center}
    \begin{minipage}[c]{0.98\textwidth}
  }
  { \end{minipage}
    \end{center}
  }
```

- it is a centered minipage environment

Sample Poster

Header for the sections

The newcommand sectionheading

```
newcommand*{\sectionheading}[1]{\vspace{2cm}
    \begin{center}
        \pbox{0.8\columnwidth}{}
        {linewidth=1mm,framearc=0.1,linecolor=lightblue,fillstyle=gradi
        {\begin{center}  \textsc{\textsc{#1}} \end{center} }
    \end{center}\vspace{1.25cm}}
```

- generates a centered pbox
- 4th parameter of pbox contains the parameter of the newcommand
  - this is the title of the section
- fonts for the section titel are set to small caps
- the section titel will be centered in a blue box
  - color of the pbox is lightblue
- the blue box will be centered in the column

Sample Poster

Generating the poster header and content

Invoking the defined new commands, environments

```
\posterheader{Symbolic Computation in a Nutshell}
        {John Doe}{Research Institute for Symbolic Computation, JKU Lin

\begin{poster}
\vspace{2cm}

\begin{pcolumn}{0.98}
\begin{multicols}{3}
\justifying

\sectionheading{Abstract}

bla bla bla
```

For more details check the LaTeX source code

Hints to LaTeX Poster

Remarks:

- by compiling the LaTeX-posters in PostScript you should use:
  - dvips -Ppdf always!
  - with this option the Type1-Fonts will be used instead of the Bitmap-Fonts.
  - scaling the fonts to high format (A0) you will get stair-steps using the default 600dpi Bitmap-fonts.

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LaTeX-Posters

Further Information

Documentation

- http://www.ctan.org/tex-archive/macros/latex/contrib/a0poster/a0_eng.pdf
- http://www.physik.tu-dresden.de/ mgraupe/daten/poster_en.html
  - blank template with 4 columns
  - SfN 2005: complete poster with 3 columns (tar.gz)
  - PMCA_2002: complete poster with 3 columns (tar.gz)
  - detailed documentation how to use a0poster
- http://nxg.me.uk/docs/posters/
  - detailed instructions
- http://www.phys.ufl.edu/
- http://andreas.welcomes-you.com/projects/a0poster/
  - a very nice poster as example, and lot of usefull links to other pages about a0-poster
- search for a0poster in the Internet for other resources

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Other Software for generating Posters

Other common possibilites (WYSIWYG)

- Corel Draw
  - RISC: Dr. Kutsia, for the RISC-Summer-200n events
- Scribus (`http://www.scribus.net` (free)
- RagTime
- QuarkXpress
- Adobe Insight
- PowerPoint

End of LaTeX Poster

Thanks for your attantion !