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摘要

这份模板是美国大学生数学建模竞赛（MCM/ICM）的论文模板。模板遵循赛事官方的要求，设置了页眉页脚、字体和摘要页等内容。本文档对模板的使用做出了说明。

1 模板介绍

这份模板最早由王昭礼设计，并在往年参赛者的建议下不断改进。2014 年初，黄晨成接手模板，用 key-value 语法重构了文档选项，并修复了一些 bug。2015 年年初，黄晨成将模板使用 DocStrip 的语法重构，并上传至 CTAN。

2 安装说明

2.1 下载

你可以到项目主页下载模板的最新版本。除去项目主页之外，不再维护任何镜像。

CTAN <http://www.ctan.org/pkg/mcmthesis>

GitCafe <https://gitcafe.com/ChinaTeX/mcmthesis>

GitHub <https://github.com/LiamHuang0205/mcmthesis>

此外，文档类也已上传至 CTAN，你可以在 T_EX Live 等发行版的宏包管理器中下载。

*这份文档是 mcmthesis v5.1.0f 的说明文档，更新日期 2015/04/21。

2.2 安装

我们以 SOURCE 代表你下载的源文件目录，在终端下执行以下命令。

```
cd SOURCE
xetex mcmthesis.dtx
xelatex -shell-escape mcmthesis.dtx
xelatex -shell-escape mcmthesis.dtx
xelatex mcmthesis-demo.tex
xelatex mcmthesis-demo.tex
```

你可以将生成的 `mcmthesis.cls` 拷贝至 `TEXMF/tex/latex/mcmthesis/` 目录，将 `mcmthesis.dtx` 拷贝至 `TEXMF/source/latex/mcmthesis/`，将 `mcmthesis.pdf`、`mcmthesis-demo.tex`、`mcmthesis-demo.pdf`、`figures/` 和 `code/` 拷贝至 `TEXMF/doc/latex/mcmthesis/`，然后在终端执行 `texhash`；也可以将 `mcmthesis.cls` 放在当前目录直接使用。

生成的 `mcmthesis-demo.tex` 是一个示例文件，你可以参照这个文件来构建你的论文；也可以直接修改这个文件。

3 使用说明

3.1 依赖

`mcmthesis` 依赖于以下宏包，这些宏包在常见的 $\text{T}_{\text{E}}\text{X}$ 发行版中都已包含，在安装使用之前，请确认你的 $\text{T}_{\text{E}}\text{X}$ 发行版中正确安装了这些宏包。

<code>kvoptions</code>	<code>etoolbox</code>	<code>fancyhdr</code>	<code>fancybox</code>
<code>ifthen</code>	<code>lastpage</code>	<code>listings</code>	<code>appendix</code>
<code>amsmath</code>	<code>amssymb</code>	<code>amsfonts</code>	<code>amsbsy</code>
<code>bm</code>	<code>mathrsfs</code>	<code>latexsym</code>	<code>paralist</code>
<code>longtable</code>	<code>multirow</code>	<code>hhline</code>	<code>tabularx</code>
<code>ctex</code>	<code>xeCJK</code>	<code>CJK</code>	<code>xCJK2uni</code>
<code>tabu</code>	<code>minted</code>	<code>longtable</code>	<code>hologo</code>
<code>array</code>	<code>flafter</code>	<code>pifont</code>	<code>calc</code>
<code>colortbl</code>	<code>booktabs</code>	<code>geometry</code>	<code>fontenc</code>
<code>berasans</code>	<code>hyperref</code>	<code>ifpdf</code>	<code>ifxetex</code>
<code>graphicx</code>	<code>epstopdf</code>	<code>bmpsize</code>	<code>xcolor</code>
<code>longtable</code>	<code>tabu</code>	<code>hologo</code>	<code>palatino</code>
<code>mwe</code>	<code>environ</code>		

如果你尚未安装这些宏包，可以启动你的 TeX 发行版的宏包管理器来安装；或者到 <http://www.ctan.org> 上搜索下载并安装。

3.2 选项

mcmthesis 定义了一些选项，用来控制模板的行为。你可以在载入文档类的时候指定这些选项的值，例如

```
\documentclass[tcn = 12345, problem = B, titlepage = false]{mcmthesis}
```

`\mcmsetup` 你也可以使用 `\mcmsetup{<key-value 列表>}` 来指定这些值，例如

```
\documentclass{mcmthesis}
\mcmsetup{tcn = 12345, problem = B, titlepage = false}
```

两种做法效果等同。

当前，mcmthesis 有七个选项：

tcn 队伍控制号码，接受一个字符串作为值；输入的值将显示在摘要页上和每一页的页眉上；默认为 0000。

problem 选题，接受一个字符串作为值；输入的值将显示在摘要页上；默认为 A。

sheet 布尔值；为真时将输出摘要页，否则不输出；默认为 true。

titleinsheet 布尔值；为真时将在摘要页输出标题，否则不输出；默认为 false。

keywordsinsheet 布尔值；为真时将在摘要页输出关键字，否则不输出；默认为 false。

titlepage 布尔值；为真时将输出标题页，否则不输出；默认为 true。

abstract 布尔值；为真时将在标题页输出摘要和关键词，否则不输出；默认值为 true。

注意，**titleinsheet** 和 **keywordsinsheet** 的效果受 **sheet** 的影响。若 **sheet** = false，则不论前二者的真假，均不会在摘要页上输出标题和/或关键字。另一方面，若 **sheet** = true，则摘要部分总是会出现在摘要页。**abstract** 与 **titlepage** 选项的关系于前述类似。

3.3 题号

`\problem` 除了使用 `\mcmsetup` 来指定题号，你还可以使用 `\problem{<题号>}` 命令来选择题号。后一种方式是为了兼容而提供的，不推荐使用。

3.4 环境

`abstract` `mcmthesis` 重新定义了 `abstract` 环境，并且定义了 `keywords` 环境。需要注意的是，他们的行为和 \LaTeX 标准的 `\title` 命令类似——在使用的時候，只是记录内容，而并不输出内容；内容的实际输出要等到 `\maketitle` 命令。

3.5 编译方式

模板支持多种编译方式：

- $\text{Xe}\text{\LaTeX}$ 这是推荐的方式；
- $\text{pdf}\text{\LaTeX}$ ；
- \LaTeX + DVIPDFMx。

3.6 中文支持

由于 MCM/ICM 要求以英文写作，所以模板没有内建的中文支持。如果你在文章中需要使用个别中文字符，可以自行使用合适中文支持方式。

对于 $\text{Xe}\text{\LaTeX}$ 来说，可以使用 `xeCJK` 宏包。

```
\usepackage{xeCJK}
\setCJKmainfont{SimSun}
```

这里，Mac OS X 的用户可以使用 `STSong` 来代替 `SimSun`；Linux 用户则可以使用 `FandolSong`。

对于 $\text{pdf}\text{\LaTeX}$ 和 \LaTeX + DVIPDFMx 来说，可以使用 `zhmCJK` 宏包。

```
\usepackage{zhmCJK}
\setCJKmainfont{SimSun.ttc}
```

对 Mac OS X 和 Linux 的说明同上。

4 版本历史

5.1.0a 首次上传到 CTAN。

5.1.0b 修复 CheckSum 和一些拼写错误。

5.1.0c 新增 `titleinsheet` 等选项。

5.1.0d 修改 `problem` 的定义方式，定义 `\mcmsetup{<key-val 列表>}` 以修改选项，调高了摘要页表格的位置，修复摘要页和标题页页码的问题，修复标题、摘要和关键字过长时分行、分页的问题。

5.1.0e 重新定义摘要页顶部的表格，以符合赛事主办方 COMAP 的最新版的摘要页。

5.1.0f 取消 TCN 和选题的红色标记。

Moreover, this template had been uploaded to CTAN, so that it could be managed by the package manager of your distribution, such as T_EX Live.

6.2 Installation

We denote SOURCE as the folder, who contains the file you've just downloaded. Execute these command in the terminal.

```
cd SOURCE
xetex mcmthesis.dtx
xelatex -shell-escape mcmthesis.dtx
xelatex -shell-escape mcmthesis.dtx
xelatex mcmthesis-demo.tex
xelatex mcmthesis-demo.tex
```

To finish the installation, you could copy `mcmthesis.cls` to `TEXMF/tex/latex/mcmthesis/`, copy `mcmthesis.dtx` to `TEXMF/source/latex/mcmthesis/`, copy `mcmthesis.pdf`, `mcmthesis-demo.tex`, `mcmthesis-demo.pdf`, `figures/` and `code/` to `TEXMF/doc/latex/mcmthesis/`, and then run `texhash` in your terminal; you could also put `mcmthesis.cls` in the same folder of the master file.

`mcmthesis-demo.tex` is a generated demo file, you could write the manuscript of you paper by mimicing this file; you may also modify this file to build your paper.

7 Usage

7.1 Dependence

The `mcmthesis` class depends on the following packages. These packages has been installed in common T_EX distribution. Before installation, please make sure that you have installed these packages correctly.

<code>kvoptions</code>	<code>etoolbox</code>	<code>fancyhdr</code>	<code>fancybox</code>
<code>ifthen</code>	<code>lastpage</code>	<code>listings</code>	<code>appendix</code>
<code>amsmath</code>	<code>amssymb</code>	<code>amsfonts</code>	<code>amsbsy</code>
<code>bm</code>	<code>mathrsfs</code>	<code>latexsym</code>	<code>paralist</code>
<code>longtable</code>	<code>multirow</code>	<code>hhline</code>	<code>tabularx</code>

ctex	xeCJK	CJK	xCJK2uni
tabu	minted	longtable	hologo
array	flafter	pifont	calc
colortbl	booktabs	geometry	fontenc
berasans	hyperref	ifpdf	ifxetex
graphicx	epstopdf	bmpsize	xcolor
longtable	tabu	hologo	palatino
mwe	environ		

If you haven't install these packages, you could execute the package manager of your distribution and install them; you could also download them from <http://www.ctan.org>.

7.2 Options

mcmthesis defined several options to control the behaviour of the template. You could specify these options while loading the class.

```
\documentclass[tcn = 12345, problem = B, titlepage = false]{mcmthesis}
```

`\mcmsetup` You may also use the command `\mcmsetup{<key-value list>}` to specify them.

```
\documentclass{mcmthesis}
```

```
\mcmsetup{tcn = 12345, problem = B, titlepage = false}
```

The two methods share the same effect.

mcmthesis has seven options.

tcn The team control number, receives a string as value; this value will be displayed on summary sheet and every page's header. The default value is 0000.

problem The question, receives a string as value; this value will be displayed on summary sheet. The default value is A.

sheet Bool, true to print the summary sheet, default is **true**.

titleinsheet Bool, true to print the title in the summary sheet, default is **false**.

keywordsinsheet Bool, true to print keywords in the summary sheet, default is **false**.

titlepage Bool, true to print the titlepage, default is `true`.

abstract Bool, true to print the abstract on the titlepage, default is `true`.

Note that the effect of `titleinsheet` and `keywordsinsheet` are under the control of the option `sheet`, that is, if `sheet` is set to `false`, title and/or keywords will not be printed on the summary sheet, whatever the value of these two options are. On the other hand, the abstract will always be printed on the summary sheet, if the `sheet` is set to `true`. The relationship between `abstract` and `titlepage` is similar to that just mentioned.

7.3 Question

`\problem` Besides using `\mcmsetup` to choose question, you could also use `\problem{(Question)}` to do this. However, the later one is here just because of backward compatibility, and is not recommended any longer.

7.4 Environment

`abstract` `mcmthesis` redefined the `abstract` environment, and defined a new environment
`keywords` named `keywords`. Note that these two environments behave like the standard `\title` — they will not print any contents to the PDF file when they are used but just record them; the output task belongs to `\maketitle`.

7.5 Compilation Workflow

The template supports various kinds of compilation workflow:

- X_YLaTeX (recommend);
- pdfLaTeX;
- LaTeX + DVIPDFMx.

8 History

5.1.0a First release to CTAN.

5.1.0b Fix the bug of CheckSum and typos.

5.1.0c Import options, such as `titleinsheet`.

5.1.0d Change the way to define problem, create `\mcmsetup{⟨key-val list⟩}` to modify the option, slightly lift the table on the summary sheet, fix the bug of page number and fix the bug of title, abstract and keywords.

5.1.0e Redefine the table at the top of the summary sheet to match the latest summary sheet from COMAP, the maker of the contest.

5.1.0f Cancele the red emphasizing of tcn and problem mark in the table at the topo of the summary sheet.

9 The Implementation

9.1 Basic Information

```

1 ⟨*class⟩
2 \NeedsTeXFormat{LaTeX2e}[1999/12/01]
3 \ProvidesClass{mcmthesis}
4 [2015/04/21 v5.1.0f The Thesis Template Designed For MCM/ICM]
5 \typeout{The Thesis Template Designed For MCM/ICM}
6 \def\MCMversion{v5.1.0f}

```

9.2 Options

Loading `kvoptions` and `etoolbox` to handle key-value options.

```

7 \RequirePackage{kvoptions}
8 \RequirePackage{etoolbox}
9 \SetupKeyvalOptions{family=MCM, prefix=MCM@opt@, setkeys=\kvsetkeys}

```

`\mcmsetup`

```

10 \newcommand{\mcmsetup}[1]{\kvsetkeys{MCM}{#1}}

```

Declaring options.

```

11 \DeclareBoolOption[true]{sheet}
12 \DeclareComplementaryOption[nosheet]{sheet}
13 \DeclareBoolOption[false]{titleinsheet}
14 \DeclareComplementaryOption[notitleinsheet]{titleinsheet}
15 \DeclareBoolOption[false]{keywordsinsheet}
16 \DeclareComplementaryOption[nokeywordsinsheet]{keywordsinsheet}

```

```

17 \DeclareBoolOption[true]{titlepage}
18 \DeclareComplementaryOption{notitlepage}{titlepage}
19 \DeclareBoolOption[true]{abstract}
20 \DeclareComplementaryOption{noabstract}{abstract}
21 \DeclareStringOption[0000]{tcn}[0000]
22 \DeclareStringOption[A]{problem}[A]
23 \DeclareDefaultOption{\relax}

```

Processing options.

```

24 \ProcessKeyvalOptions*\relax
    Loading document class.
25 \LoadClass[a4paper, 11pt]{article}
    User interface.
26 \newcommand{\team}{Team \#\ \MCM@opt@tcn}

```

9.3 Loading Packages

```

27 \RequirePackage{fancyhdr, fancybox}
28 \RequirePackage{ifthen}
29 \RequirePackage{lastpage}
30 \RequirePackage{listings}
31 \RequirePackage[toc, page, title, titletoc, header]{appendix}
32 \RequirePackage{paralist}
33 \RequirePackage{amsthm, amsfonts}
34 \RequirePackage{amsmath, bm}
35 \RequirePackage{amssymb, mathrsfs}
36 \RequirePackage{latexsym}
37 \RequirePackage{longtable, multirow, hhline, tabularx, array}
38 \RequirePackage{flafter}
39 \RequirePackage{pifont, calc}
40 \RequirePackage{colortbl, booktabs}
41 \RequirePackage{geometry}
42 \RequirePackage[T1]{fontenc}
43 \RequirePackage[scaled]{berasans}
44 \RequirePackage{hyperref}
45 \RequirePackage{ifpdf, ifxetex}
46 \RequirePackage{environ}

```

Loading graphicx and its relations after checking drivers.

```

47 \ifpdf
48   \RequirePackage{graphicx}
49   \RequirePackage{epstopdf}
50 \else
51   \ifxetex
52     \RequirePackage{graphicx}
53   \else
54     \RequirePackage[dvipdfmx]{graphicx}
55     \RequirePackage{bmplib}
56   \fi
57 \fi
58 \RequirePackage{xcolor}

```

9.4 hyperref Settings

```

59 \ifpdf
60   \hypersetup{hidelinks}
61 \else
62   \ifxetex
63     \hypersetup{hidelinks}
64   \else
65     \hypersetup{dvipdfm, hidelinks}
66   \fi
67 \fi

```

9.5 Page Layout

Setting paper size and margin sep.

```
68 \geometry{a4paper, margin = 1.2in}
```

Making the footer and header.

```

69 \pagestyle{fancy}
70 \fancyhf{}
71 \lhead{\small \team}
72 \rhead{\small Page \thepage\ of \pageref{LastPage}}

```

Setting \parskip.

```
73 \setlength\parskip{.5\baselineskip}
```

9.6 Redefining TOC

```

74 \renewcommand\tableofcontents{%
75   \centerline{\normalfont\Large\bfseries\contentsname
76     \mkboth{%
77       \MakeUppercase\contentsname}{\MakeUppercase\contentsname}}%
78   \vskip 5ex%
79   \@starttoc{toc}%
80   }

```

9.7 Mastering Floats, Figures and Tables

Setting counters. Here `totalnumber` is the maximum number of floats on a text page, `topnumber` is the maximum number of floats at top of a text page and `bottomnumber` is the maximum number of floats at bottom of a text page. Obviously, we have `totalnumber = topnumber + bottomnumber`.

```

81 \setcounter{totalnumber}{4}
82 \setcounter{topnumber}{2}
83 \setcounter{bottomnumber}{2}

```

Setting float fractions.

```

84 \renewcommand{\textfraction}{0.15}
85 \renewcommand{\topfraction}{0.85}
86 \renewcommand{\bottomfraction}{0.65}
87 \renewcommand{\floatpagefraction}{0.60}

```

Setting caption names.

```

88 \renewcommand{\figurename}{Figure}
89 \renewcommand{\tablename}{Table}

```

Setting graphic paths.

```

90 \graphicspath{./img/}{./fig/}{./image/}{./figure/}{./picture/}
91   {./imgs/}{./figs/}{./images/}{./figures/}{./pictures/}

```

9.8 Designing Sheets and their Relations

Redefining `\maketitle`, which will check if the control sheet and titlepage should be printed.

```

92 \def\maketitle{%
93   \let\saved@thepage\thepage
94   \let\thepage\relax
95   \ifMCM@opt@sheet

```

```

96 \makesheet
97 \fi
98 \newpage
99 \ifMCM@opt@titlepage
100   \MCM@maketitle
101 \fi
102 \let\thepage\saved@thepage
103 \setcounter{page}{0}
104 \clearpage
105 \pagestyle{fancy}
106 }

```

Making the abstract environment.

```

107 \def\abstractname{Summary}
108 \RenewEnviron{abstract}{\xdef\@abstract{\expandonce\BODY}}
109 \def\make@abstract{%
110   \begin{center}
111     \textbf{\abstractname}
112   \end{center}
113   \@abstract\par
114 }

```

Making the keywords environment.

```

115 \def\keywordsname{Keywords}
116 \NewEnviron{keywords}{\xdef\@keywords{\expandonce\BODY}}
117 \def\make@keywords{%
118   \par\noindent\textbf{\keywordsname}:
119   \@keywords\par
120 }

```

Defining the \makesheet.

```

121 \newcommand{\problem}[1]{\mcmsetup{problem = #1}}
122 \def\makesheet{%
123   \pagestyle{empty}%
124   \null%
125   \vspace*{-6pc}%
126   \begin{center}
127     \begin{group}
128       \setlength{\parindent}{0pt}
129       \begin{minipage}{0.28\linewidth}

```

```

130     For office use only\{4pt}
131     \makebox[0.15\linewidth][1]{T1}\rule[-2pt]{0.85\linewidth}{0.5pt}\{4pt}
132     \makebox[0.15\linewidth][1]{T2}\rule[-2pt]{0.85\linewidth}{0.5pt}\{4pt}
133     \makebox[0.15\linewidth][1]{T3}\rule[-2pt]{0.85\linewidth}{0.5pt}\{4pt}
134     \makebox[0.15\linewidth][1]{T4}\rule[-2pt]{0.85\linewidth}{0.5pt}
135     \end{minipage}%
136     \begin{minipage}{0.44\linewidth}
137     \centering
138     Team Control Number\{0.7pc}
139     {\LARGE\textbf{\MCM@opt@tcn}}\{1.8pc}
140     Problem Chosen\{0.7pc}
141     {\Huge\textbf{\MCM@opt@problem}}
142     \end{minipage}%
143     \begin{minipage}{0.28\linewidth}
144     For office use only\{4pt}
145     \makebox[0.15\linewidth][1]{F1}\rule[-2pt]{0.85\linewidth}{0.5pt}\{4pt}
146     \makebox[0.15\linewidth][1]{F2}\rule[-2pt]{0.85\linewidth}{0.5pt}\{4pt}
147     \makebox[0.15\linewidth][1]{F3}\rule[-2pt]{0.85\linewidth}{0.5pt}\{4pt}
148     \makebox[0.15\linewidth][1]{F4}\rule[-2pt]{0.85\linewidth}{0.5pt}
149     \end{minipage}\par
150     \rule{\linewidth}{0.5pt}\par
151     \textbf{\Large\the\year}\%
152     Mathematical Contest in Modeling (MCM/ICM) Summary Sheet}%
153     \par
154     \endgroup
155     \vskip 10pt%
156     \ifMCM@opt@titleinsheet
157     \normalfont \LARGE \@title \par
158     \fi
159     \end{center}
160 \ifMCM@opt@keywordsinsheet
161     \make@abstract
162     \make@keywords
163 \else
164     \make@abstract
165 \fi}

     Defining the \MCM@maketitle
166 \newcommand{\MCM@maketitle}{%

```

```

167 \begin{center}%
168 \let \footnote \thanks
169 {\LARGE \@title \par}%
170 \vskip 1.5em%
171 {\large
172 \lineskip .5em%
173 \begin{tabular}[t]{c}%
174 \@author
175 \end{tabular}\par}%
176 \vskip 1em%
177 {\large \@date}%
178 \end{center}%
179 \par
180 \vskip 1.5em%
181 \ifMCM@opt@abstract%
182 \make@abstract
183 \make@keywords
184 \fi%
185 }

```

9.9 Mathematics

Theorems.

```

186 \newtheorem{Theorem}{Theorem}[section]
187 \newtheorem{Lemma}{Theorem}{Lemma}
188 \newtheorem{Corollary}{Theorem}{Corollary}
189 \newtheorem{Proposition}{Theorem}{Proposition}
190 \newtheorem{Definition}{Theorem}{Definition}
191 \newtheorem{Example}{Theorem}{Example}

```

Other definitions.

```

192 \providecommand{\dif}{\mathop{\!}\!\mathrm{d}}
193 \providecommand{\me}{\mathrm{e}}
194 \providecommand{\mi}{\mathrm{i}}

```

9.10 Listing Settings

```

195 \definecolor{grey}{rgb}{0.8,0.8,0.8}
196 \definecolor{darkgreen}{rgb}{0,0.3,0}

```

```
197 \definecolor{darkblue}{rgb}{0,0,0.3}
198 \def\lstbasicfont{\fontfamily{pcr}\selectfont\footnotesize}
199 \lstset{%
200 % indexing
201   % numbers=left,
202   % numberstyle=\small,%
203 % character display
204   showstringspaces=false,
205   showspaces=false,%
206   tabsize=4,%
207 % style
208   frame=lines,%
209   basicstyle={\footnotesize\lstbasicfont},%
210   keywordstyle=\color{darkblue}\bfseries,%
211   identifierstyle=,%
212   commentstyle=\color{darkgreen},%\itshape,%
213   stringstyle=\color{black}%
214 }
215 \lstloadlanguages{C,C++,Java,Matlab,Mathematica}
216 \endclass
217 \endinput
```