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Easy-to-use Chinese $\mathcal{M}$TEX Suite

Hongbin Ma

Email mathmhb@bit.edu.cn
Address School of Automation, Beijing Institute of Technology, Beijing 100081, P. R. China

1 Motivation of Developing $\mathcal{M}$TEX

As the main developer of Chinese $\mathcal{M}$TEX Suite , or simply $\mathcal{M}$TEX [1], I started to fall in love with TEX[2] and LATEX[3] in 2002 when I was still a graduate student majoring in mathematics and cybernetics at the Academy of Mathematics and Systems Science, Chinese Academy of Sciences. At that time, recommended by some senior students, I started to use Chinese CTEX Suite , or simply CTEX[4], which was maintained by Dr. Lingyun Wu[5], a researcher in our academy, and is roughly a collection of pre-configured MiKTEX system[6] packaged with other tools such as customized WinEdt[7] for Chinese TEXers. CTEX brings significant benefits to China TEX users and it helps much to popularize the use of LATEX in China, especially in the educational and academic areas with large requirement on mathematics typesetting. Furthermore, at that time, CTEX provides one way to typeset Chinese documents easily with LATEX and CCT [8] (Chinese-Typesetting-System), which was initially developed by another researcher Prof. Linbo Zhang[9] in our academy since 1998 for the purpose of typesetting Chinese with LATEX. Besides CCT system, another system called TY (Tian-Yuan) system [10] was invented by a group in Eastern China Normal University so as to overcome the difficulties of typesetting Chinese with LATEX using different idea. These work make considerable efforts to address the nature of Chinese itself, for example, using certain widely used Chinese fonts, adopting proper Chinese font sizes, carefully coping with the spacing of characters, breaking the lines according to Chinese culture, and so on. Due to the complexities involved in Chinese typesetting, in the last decade, Chinese TEX users are mainly using CTEX so as to avoid the nontrivial

configuration procedure of Chinese typesetting for the Chinese fonts and tools used.

As a user of CTEX suite, gradually I found some disadvantages of CTEX suite despite that it has many benefits.

- First, it is a huge software collection which takes hundreds of megabytes, which makes it time-consuming to download and install. Either the installation or uninstallation process needs to take a long time.
- Second, it is not portable not only because it is very big but also because an installation process is necessary. We often need to work on different computers, hence a green and portable TEX system without configuration is desirable.
- Third, it lacks many features and tools I want. Here are some examples:
  - TY system is not included and configured in CTEX .
  - I hope to make LATEX can include graphics files of any commonly used format (e.g., `.gif` , `.tif` , `.bmp` , `.png` , `png` , `.eps` , `.pdf` graphics files).
  - I hope the compilation process can be smarter than before so that proper TEX engine (TEX, eTEX, LATEX, LATEX209, pdfLATEX, XeTEX, XeLATEX, LuaTEX[11], etc.) can be invoked with necessary options and proper tools (such as bibtex [12], makeindex , cct , patchdvi , ty , gbk2uni [13], fixbbl [14], ppower4 [15], etc.) can be invoked automatically to correctly process Chinese typesetting, generate references, make index list, and so on.
  - I hope to be able to insert LATEX symbols or commands or any code snippets or any document template in any text file editor (even notepad in windows) with a simple individual tool.
  - I hope to be able to conveniently use formulas generated by LATEX in any Windows © applications like PowerPoint ©, WinWord ©, WPS ©, and so on.
  - I hope to be able to support TEX engines, `.dvi` viewers, `.ps` viewers, `.pdf` viewers, editors, spell checkers in unified ways and the users can have the right to choose from a list of available choices. For example, besides the commercial Adobe Acrobat Reader © or Adobe Acrobat ©, we have other possible choices like SumatraPDF , PdfXCView , Foxit PDF Reader , or even GsView .

  - I hope to be able to switch to proper place in `.tex` files when viewing `.pdf` files, just like the inverse search feature of some `.dvi` viewers like YAP or DviWin .

- Furthermore, I hope to do all text editing jobs (such as TEXing, programming, designing web, and so on) with a powerful,customizable yet small editor which does not fit the purpose of TEXing only. WinEdt [7] is simply too large and not quite powerful for general-purpose text editing and customization. For example, I hope the editor can automatically complete proper right bracket when I type left bracket, e.g. completing $\backslash right]$ automatically for $\backslash left[$.
- I hope to integrate more utilities in the editor, for example, various compilers, code formatting tool, subversion version control, and so on.
- Finally, the MiKTEX shipped with CTEX looks very complex with thousands of files (many files are outdated and many files may never be used), difficult to configure Chinese fonts, highly dependent of Windows registry, very complicated for directory structure.

Motivated by the above issues and my own long learning experience for LATEX, I hope to make an easy-to-learn and easy-to-use unique TEX distribution with clean directory structure, very necessary files, small size, valuable extra features, selected documents, and so on. To this end, I started to investigate various kinds of TEX distributions, including fpTEX [16], MiKTEX [6], DosTP [17], EmTeX [18], BakomaTEX [19], and so on. From these existing TEX distributions, by studying the whole directory structure, the file searching mechanism, the complex font processing mechanism, the main command-line tools, the configuration files, and even the monitored registry changes, it became clearer and clearer to me on how the existing TEX systems work. Based on these continuously-growing understanding, I started to build my own initial $\mathcal{M}$TEX system on the basis of EmTeX with reorganized directory structure plus a bundle of home-made batch scripts running with 4DOS ©, as well as some unique tools and wrappers which are mainly developed with Delphi ©, Tiny C Compiler , and MASM32 . The rar-packed archive of the initial $\mathcal{M}$TEX occupies less than 20 Megabytes disk space, integrating carefully customized 4DOS [20]©(*JP Soft*), EmTeX , EditPlus [21]©, Acrobat Reader 4 ©, Ghost Script [22], CCT , TY , my own batch scripts and small tools developed to fit my needs. Upon the requests of some friends, the early version of $\mathcal{M}$TEX was re-

leased in CTEX forum in 2005. From then on, according to my growing needs and the users' bug reports as well as feature requests, I made continuous efforts to improve $\mathcal{M}$TEX to make it as modern as other TEX distributions, especially since 2007, great changes were introduced into $\mathcal{M}$TEX to make it cutting edge with the latest TEX engines/utilities/macros/fonts/documents and extendable with a unified mechanism, implemented with Take Commander Console [23] batch scripts, to manage all the components of $\mathcal{M}$TEX. Currently, the TEX engines (executable files) of $\mathcal{M}$TEX are mainly taken from W32TEX directly, while the fonts and the macros are updated from CTAN with the batch scripts. Note that due to the open extendable framework of $\mathcal{M}$TEX, any other TEX engines (e.g. MiKTEX,DosTP) can be used by making minor changes to $\mathcal{M}$TEX configuration files, where command aliases, environment variables, searching paths, and other settings are defined by text files. Now $\mathcal{M}$TEX has been used by many Chinese users and some friends in other countries including Singapore, U.S., U.K., and so on.

2 Main Features of $\mathcal{M}$TEX

2.1 $\mathcal{M}$TEX Is Free

Roughly speaking, $\mathcal{M}$TEX (kernel itself) is released as a freeware for non-commercial use and users can use it *as is* without any fee in their personal studies or work. The source codes of $\mathcal{M}$TEX kernel files can be found in `http://mtex-kernel.googlecode.com/`. We do not plan to make money from this software, however, we would like to accept donations so as to provide certain financial support to our great efforts in maintaining and enhancing this software. As to the detailed licensing description of $\mathcal{M}$TEX, the users may refer to files *LICENSE.** in the folder of $\mathcal{M}$TEX.

The licensing of the components of $\mathcal{M}$TEX should not be affected by the license of $\mathcal{M}$TEX kernel, and we do not provide registration or crack for the sharewares or commercial softwares which are included in $\mathcal{M}$TEX. Although theoretically speaking, any software can be made as one component of $\mathcal{M}$TEX according to the unified packaging rule, normally we mainly select and put free, small and useful softwares in the repository of $\mathcal{M}$TEX servers.

We need also remark that $\mathcal{M}$TEX is *virus-less* and it does not contain any viruses or malwares. However, some anti-virus softwares may issue wrong alerts

for some tiny or packed .exe files in $\mathcal{M}$TEX due to their (imperfect or stupid) virus detection mechanism. Note that we may use upx [24] to pack some big .exe files to save disk space and we also use optimized compilers or libraries to generate very small .exe files, for example, several useful tools in $\mathcal{M}$TEX are compiled with Delphi © compiler DCC32 and KOL [25], which can generate very small .exe file. In such cases, the users need to add the folder of $\mathcal{M}$TEX to the white list or safe area of the anti-virus software so that the anti-virus software can trust the files in $\mathcal{M}$TEX directly.

2.2 $\mathcal{M}$TEX Is Integrated

$\mathcal{M}$TEX is a self-contained *integrated* TEX distribution, hence, by using $\mathcal{M}$TEX, the users need not install any other TEX distributions like MiKTEX, and the users need not install other related softwares such as Adobe Acrobat Reader ©, Ghost Script [22], GsView [26], WinEdt ©, Perl , etc. since $\mathcal{M}$TEX has provided such utilities or replacements.

2.3 $\mathcal{M}$TEX Is Powerful

Exactly speaking, $\mathcal{M}$TEX is not only a TEX distribution since it has many unique features and many useful addons organized in unified elegant ways. In fact, $\mathcal{M}$TEX is a *powerful* software platform, which contains a suite of home-made and third-party selected utilities/documentations/engines/fonts/macros, aiming at providing *an integrated software solution* for almost all the jobs in the authors' studies and work, vast from scientific typesetting, scientific computation, scientific drawing, to programming design, website design, spelling checking, file conversion, and so on.

2.4 $\mathcal{M}$TEX Is Small

Comparing with most other TEX distributions, $\mathcal{M}$TEX is very *small* which is mainly due to careful design, selection, reduction and refinement of its components. A typical $\mathcal{M}$TEX installation occupying less than 200 Megabytes disk space, whose packed self-extractor is only about 50 Megabytes, can fit most needs of the users.

Noting of the famous 80-20 rule, we have made the following efforts to make $\mathcal{M}$TEX very compact yet functional:

- Reducing unnecessary files which are seldom-used in daily work.
- Placing infrequently used components in the $\mathcal{M}$TEX servers.
- Optimizing and customizing important components.
- Stripping comments of macro packages to save space.
- Designing the $\mathcal{M}$TEX kernel elaborately to make it flexible and extendable.
- Selecting many small command-line tools and combining them efficiently by using batch scripts.
- Developing our own $\mathcal{M}$TEX tools via outstanding compilers and libraries.

2.5 $\mathcal{M}$TEX Is Extendable

$\mathcal{M}$TEX provides one unique *download-and-install-on-the-fly* mechanism for the TEX engines, editors, utilities, fonts, macros, and documentations, which means that the users need not install many seldom-used components yet the users are able to invoke full functions provided in the $\mathcal{M}$TEX servers when necessary. On $\mathcal{M}$TEX servers, currently dozens of editors, hundreds of utilities, over five hundred fonts, near one thousand documentations, and about two thousand macro packages have been provided to cover various needs of the users. With this mechanism, we are able to provide $\mathcal{M}$TEX users more ready-to-use components than existing TEX distributions, and this mechanism greatly extends the practical usages of $\mathcal{M}$TEX so that $\mathcal{M}$TEX does not restrict in serving as a TEX distribution only. Note that, according to this mechanism, almost any software can be packed as $\mathcal{M}$TEX components with minor efforts, hence the number of $\mathcal{M}$TEX components is gradually growing upon the the requirement of ourselves and the users.

2.6 $\mathcal{M}$TEX Is Green and Portable

$\mathcal{M}$TEX is *green* and *portable*. This means that the users can put the $\mathcal{M}$TEX folder into thumb drive or removable disk or even compact disk and use it anywhere anytime without a specific installation process like most Windows applications.

Many efforts are conducted to make $\mathcal{M}$TEX easy-to-use without special configuration, especially, it does not need to modify Windows registry unless certain third-party utility requires to do so, in which case we use the *auto-configuration* mechanism of $\mathcal{M}$TEX designed for all utilities to make every utility portable and re-configurable without concerning the actual path of $\mathcal{M}$TEX folder. Furthermore, the portability of $\mathcal{M}$TEX makes $\mathcal{M}$TEX co-existable with other TEX distributions in the same computer, although installation of other TEX distributions is completely not necessary or recommended if the users use $\mathcal{M}$TEX for TEXing.

2.7 $\mathcal{M}$TEX Is Cutting Edge

Some well known TEX distributions, e.g. emTeX and fpTeX , have stopped maintaince and updating. However, we know that although the most fundamental TEX engine invented by D. E. Knuth[27] have been frozed, the techniques related with TEX have been changing always in recent years, and some new TEX engines, macros, tools, and fonts have emerged. As far as I know, many people are still using the out-dated MiKTEX 2.4. To enable the users to try the latest TEX techniques, $\mathcal{M}$TEX is very cutting edge in sense that it is often updated with the latest TEX engines, macros, tools, and fonts which are downloaded and processed by our own batch scripts. As a small yet featureful TEX distribution, $\mathcal{M}$TEX allows the users to update to the latest version easily by clicking the button *[Update MTeX Components]* in the *$\mathcal{M}$TEX Main Menu*. All installed components can be updated automatically or manually.

2.8 $\mathcal{M}$TEX Has Multi-language Interface

$\mathcal{M}$TEX supports *multiple-language* user interface and has been configured well for Chinese users to typeset *Chinese*. With $\mathcal{M}$TEX, users can easily switch among user interfaces for different code pages provided that corresponding configuration files (language files) of the requested code page exist in $\mathcal{M}$TEX. Currently, since the users of $\mathcal{M}$TEX are mainly Chinese students or teachers or researchers, besides the default *English* (codepage:437) user interface for non-Chinese code pages, we have mainly provided language files for *Simplified Chinese* (codepage:936) and *Traditional Chinese* (codepage:950) user interfaces. So if the users have interests to translate the language files, please contact the author so as to make $\mathcal{M}$TEX more

international.

2.9 $\mathcal{M}$TEX Has Special Design for Chinese

As mentioned before, typesetting Chinese documents may be more complex than typesetting English documents, and hence Chinese TEX community has made many efforts and invented number of tools and macro packages to make the Chinese typesetting happier. However, unfortunately, most of them are only released in Chinese forums and hence most of them are not available in CTAN[28] or western world. As a TEX system mainly for Chinese users, $\mathcal{M}$TEX integrates most existing tools and macro packages for Chinese typesetting, and provides corresponding compilation options in the settings dialog for the main compilation command *clatex*, which is in charge of almost all the *smart compilation* procedure for various TEX source files.

2.10 $\mathcal{M}$TEX Has Special Design for Beginners

As a LATEX user, I know that many people feel that LATEX is very difficult to learn. To help $\mathcal{M}$TEX users to learn and practice, $\mathcal{M}$TEX provides many demo examples, templates, selected documents, as well as some tips for beginners. From my own learning experience and teaching experience, I think LATEX can be easy to learn in the right way:

- Use existing examples to demonstrate the basic compilation procedure and the great power of LATEX;
- Use one simple example to illustrate the key philosophy of LATEX — focusing on the structure and contents rather than typesetting details, i.e. *What You Think Is What You Get* rather than *What You See Is What You Get*;
- Add more elements to the simple example to illustrate more elements of LATEX such as mathematics, tables, figures, references, and so on;
- Read the selected documents (such as *lshort.pdf* [29]) to gain comprehensive understanding to LATEX;
- Learn from continuous practice, gradually practice will make perfect. In this process, users are suggested to learn to search the local macro files and read the documents provided in the $\mathcal{M}$TEX servers.

With $\mathcal{M}$TEX, following the above ideas, in my graduate courses, for those students who never know LATEX before, I usually just use 20 to 30 minutes to introduce the installation of $\mathcal{M}$TEX and basic usage of LATEX by examples, then almost all the students can use LATEX to complete their assignments and projects in my courses, which shows that TEXing with $\mathcal{M}$TEX is not difficult for most students.

3 Installation of $\mathcal{M}$TEX

3.1 Fresh Installation

We provide two ways to "install" a fresh $\mathcal{M}$TEX suite: one way is to download an self-extraction archive which contains a pre-configured typical installation, and the other way is to download a tiny installer which allows the user to customize, download and install chosen components. Both ways essentially unpack some archives to the specified installation folder. Note that $\mathcal{M}$TEX is green hence the users may also copy an existing $\mathcal{M}$TEX folder to removable disks or other computers.

Existing $\mathcal{M}$TEX Servers With the help of some friends and users of $\mathcal{M}$TEX, we have set up several $\mathcal{M}$TEX servers, and a list of them can be found in the official website of $\mathcal{M}$TEX: `http://mtex.sf.net`. Among these servers, we mainly recommend two servers:

- `ftp://ftp.ctex.org/pub/tex/systems/mtex/`
- `ftp://mtex:mtex@10.106.2.170/mtex/`

where the last one is only accessible in the campus of Beijing Institute of Technology and it is the recommended server for the students and the researchers of Beijing Institute of Technology due to its fastest download speed of intra-net. More servers can be added if users would like to provide mirrors; in this case, please contact the author directly.

Typical Installation This approach is recommended for most users. The following steps are needed with this approach:

1. Download self-extractor *mtex20??.exe* (about 50 Megabytes) from any server.

2. Run the downloaded self-extractor and input the destination of $\mathcal{M}$TEX folder when prompted.
3. Wait one minute until the self-extractor finishes extraction and quits.

In the second step, the users are suggested to type "c:\" or "d:\" as destination, i.e. the $\mathcal{M}$TEX suite will be installed to folder *c:\mtex* or *d:\mtex*. Note that the destination path should not contain space or Chinese characters so as to avoid unnecessary troubles of path parsing in the batch scripts.

Customized Installation This approach is suitable for experts who want to customize the components upon installation. Note that this approach is not recommended since the users can always add new components after a typical installation. The following steps are needed with this approach:

1. Download the tiny installer *m-setup.exe* (about 80 Kilobytes) and all configuration files *m-setup.*.** from the "*current*" folder of any server and save them to a temporary folder, say e.g. *e:\m-setup*;
2. Run the installer and input the destination path of $\mathcal{M}$TEX folder (the default path is *c:\mtex*).
3. Click the button *[Setup network]* to configure and test the internet connection: first click the button *[1. Test Internet connection]*, the installer will test the network and prompt the users the network status, then if the network is okay, the users can click the button *[2 .Download and load config files]* to download files needed by the installer.
4. Close the dialog of *[Setup network]*, and then the users are able to customize the components needed. Description of each component will be shown on the right side if the mouse is put over that component.
5. Once the user has chosen the components to install, the user can click the button *[Install now]* to start the installation. The installer will download the components from $\mathcal{M}$TEX servers, and then it will extract them to proper sub-folders of the destination path.
6. Wait until the installer finishes downloading and extraction, then the installer will automatically launch the configuration dialog (see §3.3).

In the second step, the users are suggested to type "c:\" or "d:\" as destination, i.e. the $\mathcal{M}$TEX suite will be installed to folder *c:\mtex* or *d:\mtex*. Note that the destination path should not contain space or Chinese characters so as to avoid unnecessary troubles of path parsing in the batch scripts.

3.2 Software Updating

$\mathcal{M}$TEX users can update $\mathcal{M}$TEX suite to latest version directly from "$\mathcal{M}$TEX Main Menu " by running *mtex\MainMenu.cmd*. Then just click button *[Update MTeX Component]* and follow the instructions step by step.

3.3 Configuration

Basic Settings Most basic settings of $\mathcal{M}$TEX can be customized, for example, the language interface, the default $\mathcal{M}$TEX server, the proxy server, the default editor, the default `.dvi` / `.ps` / `.pdf` viewer, and so on. Usually all these settings are not necessary to change since $\mathcal{M}$TEX will detect and provide proper defaults. For example, if the user is running on Simplified Chinese Windows, then it will automatically use Simplified Chinese interface; if the user is running a non-Chinese Windows, it will use the default English interface.

1. Invoke "$\mathcal{M}$TEX Main Menu" by running *mtex\MainMenu.cmd*.
2. Click button *[Basic Settings]* and a dialog of *MTeX Basic Settings* will appear.
3. Make necessary customization in the dialog.
4. Click button *[Save]* if some settings were changed; otherwise, just click button *[Cancel]* or button *[Reset Defaults]* and then quit.

To save space, here we do not introduce the details of basic settings. In current typical installation of $\mathcal{M}$TEX, the default TEX editor is Sc1IDE [30], the default `.dvi` viewer is DviWin [31], the default `.ps` viewer is automatically chosen as GsView [26], and the default `.pdf` viewer is SumatraPDF [32].

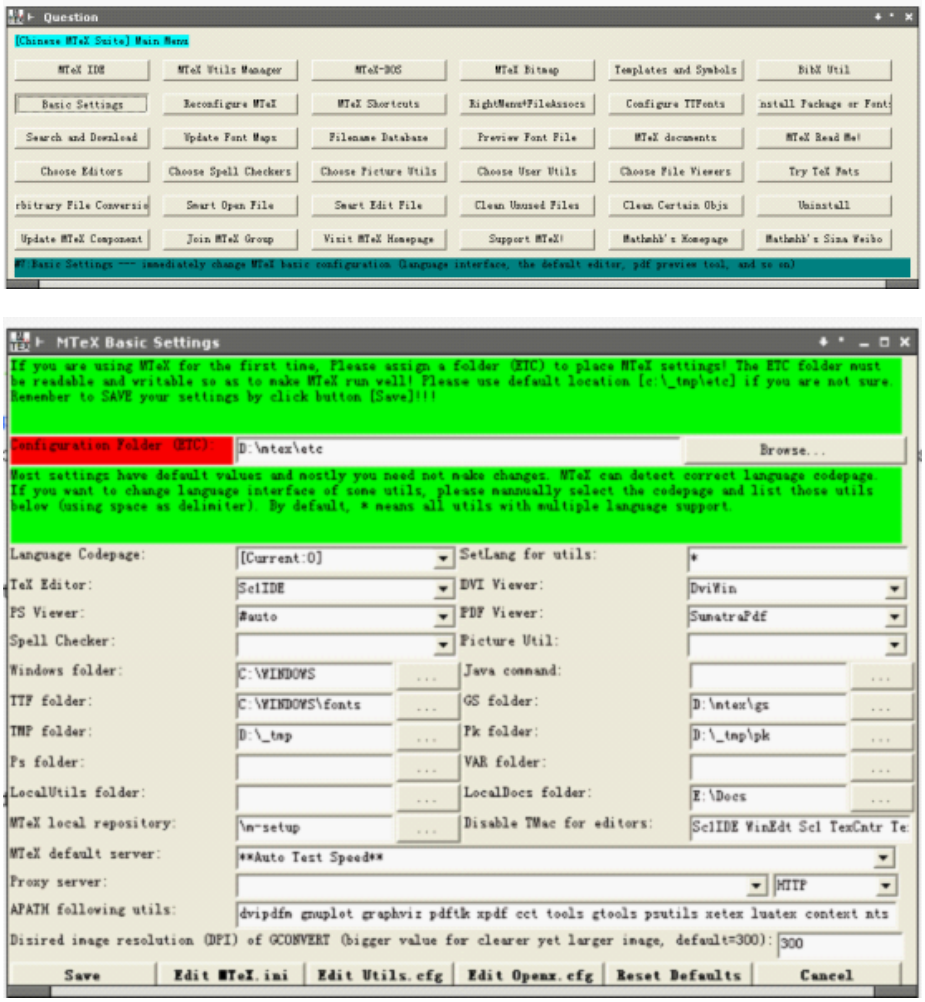

Figure 1: Basic Settings for $\mathcal{M}$TEX

Create Shortcuts The users are suggested to create shortcuts for $\mathcal{M}$TEX for convenience. To do this, the users just need to do the following steps:

1. Invoke "$\mathcal{M}$TEX Main Menu" by running *mtex\MainMenu.cmd*.
2. Click button *[MTeX Shortcuts]* and a message box will appear.
3. Click button *[Create Shortcuts]* to create some shortcuts.

The users can also remove the shortcuts at any time by similar operations except that the users need to click button *[Delete Shortcuts]* in the last step.

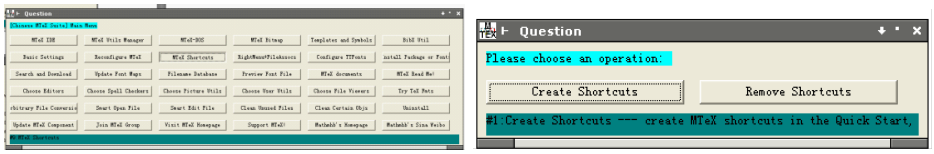

Figure 2: Create Shortcuts for $\mathcal{M}$TEX

Once shortcuts are created, the users can invoke $\mathcal{M}$TEX editor, $\mathcal{M}$TEX-DOS, $\mathcal{M}$TEX Main Menu directly from the desktop, and user can access some unique *Send To ...* shortcuts for selected file in the explorer:

- *Smart Open with MTeX*: Smartly uses proper utility to open/view the selected file according to its file type.
- *Smart Edit with MTeX*: Smartly uses proper utility to edit the selected file according to its file type.
- *Smart Convert with MTeX*: Smartly uses proper utility to convert the selected file according to its file type.
- *MTeX Dos Prompt*: Provides a unique DOS prompt window which is much more powerful than Microsoft Command Prompt.
- *MTeX IDE*: Edits the file with the default TEX editor.

Note that the first three shortcuts are very powerful since they support arbitrary file types, and the actions they will do for different file types are completely defined in the configuration file `openx.cfg` , which in fact provides one elegant and "green" way to replace the complex file association mechanism of Windows via the registry. For example, for a selected file *hello.idle* written in *Idle* scripting language, *Smart Open with MTeX* will prompt several choices (shown in Figure 3) like *Idle*,*IdleW*,*Idle2Exe* and *Idle2Exe-GUI*, then clicking *[Idle2Exe]* will result in download-and-install-on-the-fly (shown in Figure 4) of the utility `Idle` , which is a component on the $\mathcal{M}$TEX servers and is not packed into the typical installation, and converting this idle script to an `.exe` file by calling command *idlec* in utitity `idle` with proper options. Related configurations in file `openx.cfg` are shown in Listing 1, which defines the possible actions for `.idle` files and the commands to launch them.

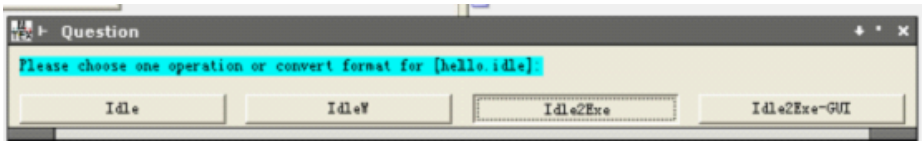

Figure 3: An example of *Smart Open with MTeX* for a file with `.idle` extension

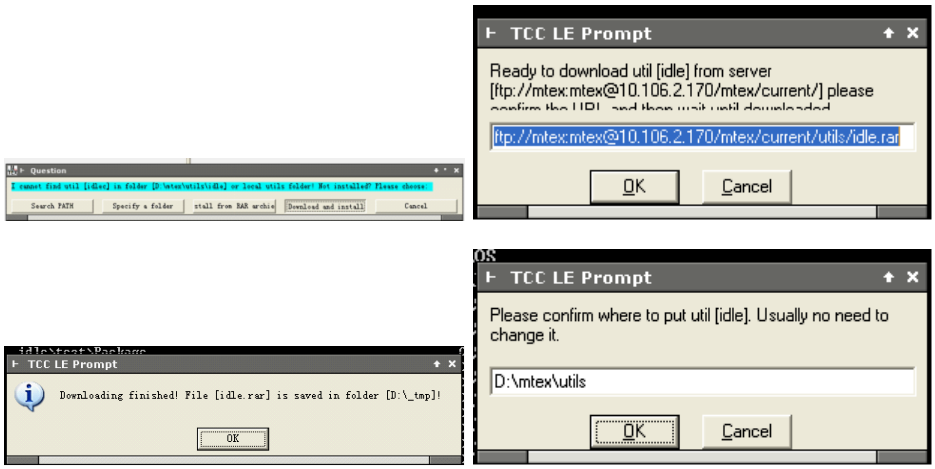

Figure 4: Snapshot of Download-and-Install-on-the-Fly of utility in $\mathcal{M}$TEX

Listing 1: Configuration example of `openx.cfg`

```
.idle=Idle/IdleW/Idle2Exe/Idle2Exe-GUI
!Idle=util idle
!IdleW=util :idle idlew
!Idle2Exe=util :idle idlec -x $N.exe $F
!Idle2Exe-GUI=util :idle idlec -w -c -x $N.exe $F
```

File Associations For convenience, the users are also suggested to associate certain files with $\mathcal{M}$TEX so that users can edit `.tex` files by double-clicking, view `.dvi` / `.ps` / `.pdf` / `.eps` files by double clicking, and so on. To this end, the users just need to do the following steps:

1. Invoke "$\mathcal{M}$TEX Main Menu" by running *mtex\MainMenu.cmd*.

2. Click button *[RightMenu+FileAssocs]* and a message box will appear.
3. Click button *[Associate MTeX Files]* and a dialog *MTeX Files Association* will appear.
4. Customize file association and click *[OK]* to associate files related with $\mathcal{M}$TEX.

Note that the users can also restore the file associations at any time by similar operations except that the users need to click button *[Clear file associations]* in the third step.

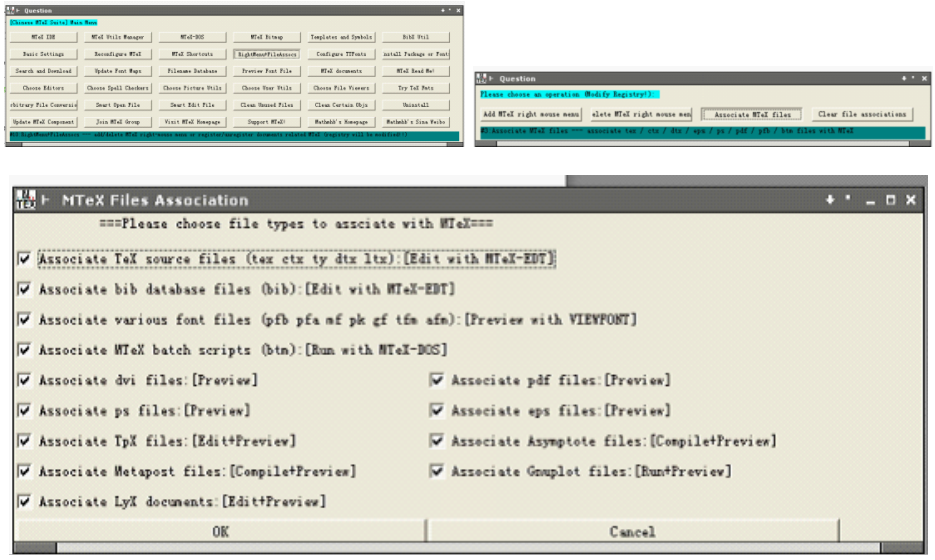

Figure 5: Snapshot of Associating Files in $\mathcal{M}$TEX

Other Possible Configurations Besides the above suggested configurations, users can also reconfigure any utilities shipped with $\mathcal{M}$TEX in a unified way when necessary. We take one example to explain this configuration. $\mathcal{M}$TEX provides one component RedMon [33], which can be used to create virtual *.pdf Printer* and *.eps Printer*, tiny replacements of Adobe Distiller ©. Of course, such an utility needs to modify the Windows registry, hence if the users want to use such virtual printers, the users need to configure it once. To this end, the users just need to do the following steps:

1. Invoke "$\mathcal{M}$TEX Main Menu" by running *mtex\MainMenu.cmd*.
2. Click button *[Reconfigure MTeX]* and a dialog on License for MTeX will appear.
3. Click button *[I agree]* to accept the license agreement and choose *[Custom Configuration]*.
4. In the dialog the users can customize some features and utilities in $\mathcal{M}$TEX, for example, select only RedMon in the right panel, and then click button *[Configure Utils Only]* to configure RedMon , which will install virtual *.pdf Printer* and *.eps Printer* step by step.

Note that the users can also let $\mathcal{M}$TEX to make *[Default Configuration]* in the third step, which will automatically make full configuration for $\mathcal{M}$TEX including creating shortcuts, associating files, font configurations, and so on.

Figure 6: Snapshot of Reconfiguring of $\mathcal{M}$TEX

4 Teaching TEXing with $\mathcal{M}$TEX

Since $\mathcal{M}$TEX is easy-to-install and easy-to-learn, with proper teaching skills, usually the teacher only needs to spend about half an hour to introduce the installation of $\mathcal{M}$TEX and basic usage of LATEX.

4.1 One Demo

Here is one simple demo to use $\mathcal{M}$TEX:

1. Invoke the default editor Sc1IDE by running *mtex\MTeX-IDE.cmd* or from desktop shortcut.
2. Open any demo file, e.g. *mtex\demo\e-sample.tex*, then the users will see LATEX codes are syntax highlighted with code folding.
3. Click toolbar button  (or hot key *Ctrl+Alt+3*) to smartly compile the TeX file with engine *pdflatex*.
4. Click toolbar button  (or hot key *Ctrl+7*) to view the generated `.pdf` file. Note that by double-clicking anywhere in the `.pdf` view, the editor will locate the cursor at corresponding line of the source file.

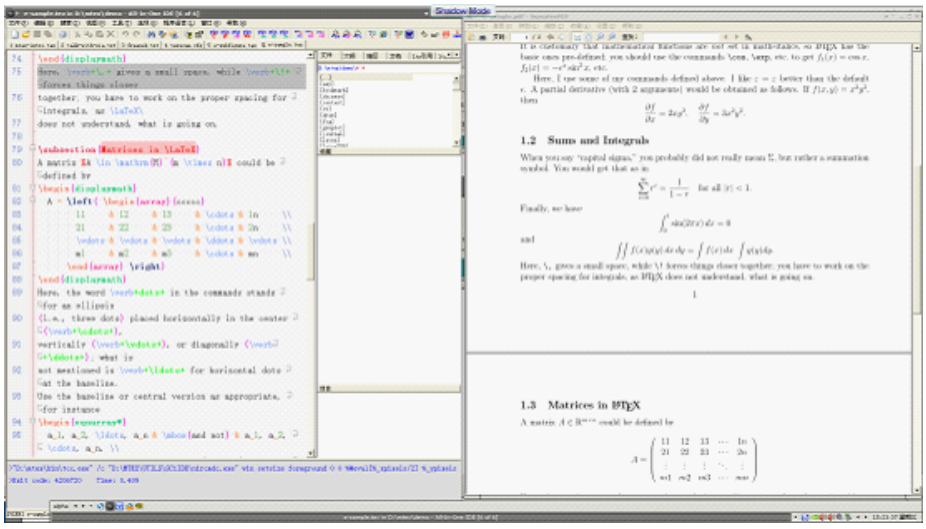

Figure 7: TEXing in $\mathcal{M}$TEX: source view and `.pdf` view

In this step, it would be much attracting for students if the teacher can compile more interesting examples in the *demo* folder such as *e-chess.tex*, *e-carom.tex*, and so on. These fancy examples on Chess, Chemistry, etc. can inspire the students to discover the great power of TEX and LATEX, which will motivate them to study LATEX by reading documents and learning by practice.

4.2 One Example

To edit a new TeX file, the teacher can do the following steps:

1. Press *Ctrl+N* to open a new buffer and press *Ctrl+S* to save it as a TeX file with `.tex` extension.
2. Type *doc* followed by *Ctrl+B* to generate one simple LaTeX template.
3. Edit the file by adding some basic commands and arbitrary text.
4. Compile the file like the above to see the effects.
5. Change the document class to *ieeetran* (or other) and recompile the file like the above.

In this step, the teacher should highlight the following important points to students:

- Firstly, LaTeX is to represent *what you think* rather than *what it looks like*, so we need not focus on the typesetting details of a document; instead, we need to think over the structure and contents of the document. This point is the most critical philosophy which distinguishes LaTeX from WinWord ©.
- Secondly, learning to use LaTeX is not difficult at all if starting with a simple easy-to-understand LaTeX template. This point is of significance for LaTeX beginners so that they are not lost at the starting point.
- Thirdly, MiTeX provides many convenient ways (abbreviation expanding, sidebar panels, templates and macros pad, etc.) to allow the user quickly typeset LaTeX commands, environment, or even a somewhat complex document template. This point will help students to gain confidence in "writing" LaTeX codes efficiently.
- Lastly, *learning LaTeX by practice and searching* is the most important key to help a LaTeX beginner become an expert gradually. This point is the most important thing for the students, hence the teacher should give enough chances for students to learn by practice. In my graduate courses, I always ask the students to finish their assignments with LaTeX by using MiTeX. Note that the teacher need not introduce many LaTeX commands to students since the students are suggested to read the classic document shipped with MiTeX

such as *lshort.pdf* and all the students will grasp LaTeX in continuous exercises of using LaTeX.

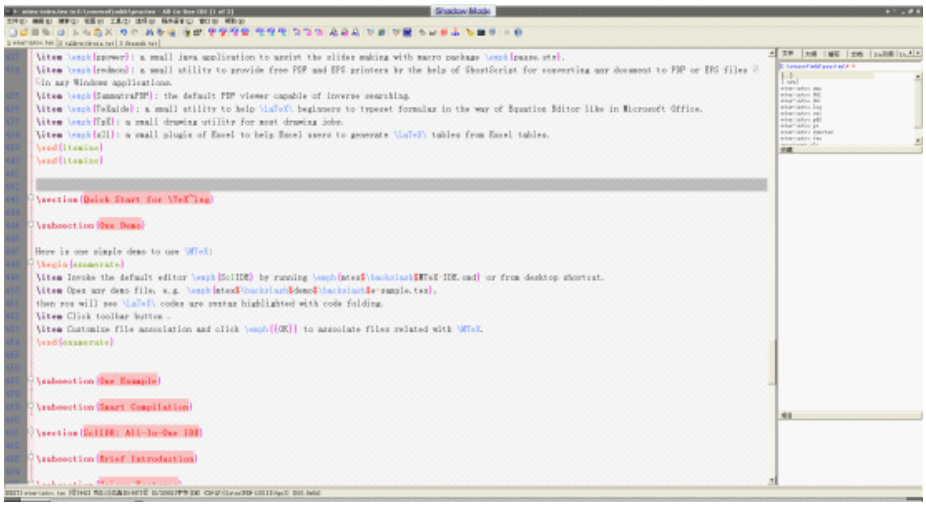

Figure 8: Snapshot of Sc1IDE: a fully functional all-in-one editor

Some editing tips will be briefly introduced in Section 6.

During the editing, users can also click the toolbar button to launch a template and symbol pad for easy inserting of LaTeX commands or symbols.

Figure 9: Snapshot of $\mathcal{M}$TEX TMac: a template and symbol pad

4.3 Smart Compilation

$\mathcal{M}$TEX provides one unique smart compilation script, *clatex.btm*, for `.tex` files and other files. Roughly speaking, this script can do some clever jobs to handle files with different extensions and different formats. For non-TEX files, it invokes command *openx -compile* to compile files via the compiler settings given in file `openx.cfg` . For TEX files, this script can do the following jobs:

- For `.ctx` file, make necessary pre-processing and post-processing needed by CCT system.
- For `.ty` file, make necessary pre-processing and post-processing needed by TY system.
- Do proper actions for all kinds of TEX files so as to make it inverse searchable for both `.dvi` and `.pdf` output.
- Generate missing pixel fonts before previewing the `.dvi` file.

- Invoke bibtex or bibtex8 automatically to support use of .bib reference database.
- Invoke makeindex or cctmkind to support index generating when necessary, even for Chinese documents.
- According to file contents, automatically determine and invoke proper TEX engine (*tex*, *latex*, *pdftex*, *pdflatex*, *xetex*, *xelatex*, etc.) to compile .tex file.
- Automatically determine whether to compile the .tex file twice, three times or four times.
- Support graphics inclusion of arbitrary image format by automatic image format conversion to required format (.eps , .pdf , or .jpg) provided that users do not explicitly give the extension of the graphics file.
- Automatically invoke metapost for the inclusion of metapost figures (**.1*, **.2*, and so on).
- Automatically invoke dvipdfm , dvips , ps2pdf , ppower when necessary.
- Support specific pre-processing and post-processing for Chinese typesetting, for example, use fixbbl and gbk2uni to fix possible errors of .bbl and .out generated.
- Pass proper options to invoked programs so as to be able to embed Type 1 fonts.
- Automatically preview generated .dvi or .pdf file if the compilation is successful.
- Make necessary processing to support special packages such as psfrag , pdftricks , mfpic , asymptote and so on.
- Pass proper options to invoked programs so as to typeset documents in landscape view or specified paper format.
- Invoke certain user-specified programs during the compilation process according to the user's *clatex* setup.
- Clean temporary files generated in the compilation.
- Specify the .pdf compatibilty level (version) for the final .pdf file.
- More jobs can be found from the *Clatex Options* dialog shown in Figure 10.

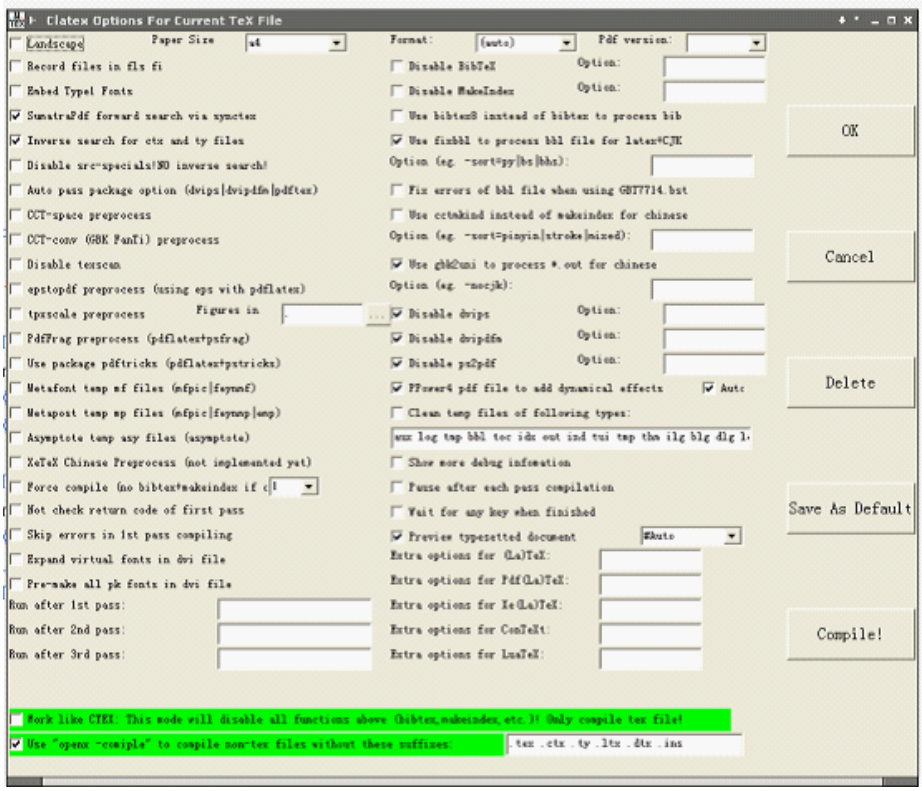

Figure 10: Snapshot of Clatex Settings

5 Brief Overview to Typical Installation

In the above, we have seen some unique features of $\mathcal{M}$TEX. In this section, we'd like to give a brief overview to the components provided in the typical installation.

5.1 $\mathcal{M}$TEX Kernel

The kernel of $\mathcal{M}$TEX (mainly the scripts and tools in folder *mtex\bin*) is the heart of $\mathcal{M}$TEX suite, which distinguishes $\mathcal{M}$TEX from most other TEX distributions. Some useful $\mathcal{M}$TEX tools in the kernel will be introduced in next subsection. Here we only list several examples of batch scripts in $\mathcal{M}$TEX to illustrate some unique features of $\mathcal{M}$TEX.

- *clatex.btm*: a script for smart compilation for all files.
- *add_doc.btm*: a script to download and install one document from the servers.
- *add_font.btm*: a script to download and install one font family from the servers or local archives.
- *add_map.btm*: a script to add one font map file and make necessary changes to map files for dvipdfm ,dvips and pdftex .
- *add_pkg.btm*: a script to download and install one font family from the servers or local archives.
- *add_util.btm*: a script to download and install one utility from the servers or local archives.
- *ask_server.btm*: a script to show available $\mathcal{M}$TEX servers and confirm user's choice for later downloading.
- *bit_server.btm*: a script to determine the $\mathcal{M}$TEX server by detecting whether the user is in the campus of Beijing Institute of Technology.
- *chkmsetup.btm*: a script to check local repository if it exists.
- *chkproxy.btm*: a script to check the Internet Explorer © proxy settings.
- *compile.btm*: a script to compile a TeX file especially the TeX file generated by TpX .
- *context.btm*: a script to compile ConTEXT file.
- *copyfnts.btm*: a script to copy font files to proper font folders from arbitrary font archives containing font files.
- *cropbmp.btm*: a script to crop bitmap images automatically.
- *cropeps.btm*: a script to crop `.eps` images automatically.
- *cropimg.btm*: a script to crop any image files automatically.
- *croppdf.btm*: a script to crop `.pdf` images automatically.
- *delx.btm*: a script to clean temporary files.
- *dir_server.btm*: a script to list files in the specified server path.
- *doc.btm*: a script to search and view local documents and even server-side documents.

– *dos2unix.btm*: a script to convert text files from DOS format to Unix format.
– *down_src.btm*: a script to download and run installer or package according to the settings given in specified utility folder.
– *dvi2img.btm*: a script to convert `.dvi` file to images, supporting frequently used image formats.
– *dvicpy.btm*: a script to expand virtual fonts to practical fonts in `.dvi` file.
– *dvimerge.btm*: a script to merge two `.dvi` files.
– *dvinup.btm*: a script to convert `.dvi` file by putting several pages on one page.
– *dviview.btm*: a script to view `.dvi` files, supporting most known `.dvi` viewers including DviWin, DviOut, WinDvi, Yap, CCTWin32, Dviscr.
– *editx.btm*: a script to invoke *openx.btm -edit*.
– *emf2eps.btm*: a script to convert `.emf` figure to `.eps` figure.
– *eps2pdf.btm*: a script to convert `.eps` figure to `.pdf` figure.
– *EqnEdit-Web.btm*: a script to invoke on-line equation editor.
– *fast-cfg.btm*: fast configuration for $\mathcal{M}$TEX.
– *gconvert.btm*: a script to make arbitrary image conversion.
– *gen_pkg_list.btm*: a script to batchly generate an Excel © file from `.tpm` files.
– *genfontdb.btm*: a script to generate font database file *fonts_db.cfg*.
– *genmakefile.btm*: a script to generate a Makefile template based on files in current folder.
– *genpkgdb.btm*: a script to generate package database file *pkgs_db.cfg*.
– *htmview.btm*: a script to view HTML files via installed or known web browser.
– *l2t.btm*: a script to convert LATEX file to pure text file.
– *latex-dtx.btm*: a script to batchly compile `.dtx` files.
– *latex-ins.btm*: a script to batchly compile `.ins` files.
– *license.btm*: a script to display license dialog.
– *main.btm*: a script to show the main menu of $\mathcal{M}$TEX.

- *makecmap.btm*: a script to generate **.cmap* files for using package [ccmap].
- *makefmts.btm*: a script to make various TEX /Metafont /Metapost formats, supporting most known TEX engines.
- *makefnt.btm*: a script to make configuration for True Type font.
- *makepk.btm*: a script to make `.pk` files from True Type fonts, Type1 fonts, metafont fonts, and Chinese fonts.
- *maketex.btm*: a script to invoke download-and-install-on-the-fly for missing macro packages.
- *maketfm.btm*: a script to make `.tfm` files from True Type fonts, Type1 fonts, metafont fonts, and Chinese fonts, supporting automatic download-and-install-on-the-fly for missing fonts when necessary.
- *mchange.btm*: a script to batchly make replacements to files via sed .
- *m-conv.btm*: a script to simply invoke smart conversion, i.e. *openx.btm -convert*.
- *mergefiles.btm*: a script to merge text files.
- *mergepdf.btm*: a script to merge `.pdf` files.
- *mftoeps.btm*: a script to convert `.mf` file to `.eps` file using mftoeps package.
- *mktexlsr.btm*: a script to generate file name database for $\mathcal{M}$TEX.
- *mp2eps.btm*: a script to convert `.mp` file to `.eps` file.
- *mp2pdf.btm*: a script to convert `.mp` file to `.pdf` file.
- *mproof.btm*: a script to compile `.mp` file and view generated mps file.
- *mrun.btm*: a script to run various commands conviniently, designed for configuring tools menu for other editors.
- *mtex-assoc.btm*: a script to help users to associate files.
- *mtexcfg.btm*: a script to configure basic settings of $\mathcal{M}$TEX.
- *mtex-cfg.btm*: a script to configure utilities in $\mathcal{M}$TEX.
- *mtex-edit.btm*: a script to invoke text editor.
- *mtex-env.btm*: a script to generate $\mathcal{M}$TEX environment cache file *mtex.env*.

- *mtex-font.btm*: a script to help users configure TrueType fonts via graphical user interface.
- *mtex-guru.btm*: a script to help users search or view macro files, useful for finding certain commands.
- *mtex-lfn.btm*: a script to resolve long file name problem in early $\mathcal{M}$TEX.
- *mtex-lnk.btm*: a script to create shortcuts for $\mathcal{M}$TEX.
- *mtex-pkg.btm*: a script to install or uninstall extra packages.
- *mtex-reg.btm*: a script to register right menu commands for $\mathcal{M}$TEX.
- *newer.btm*: a script to detect whether one file is newer than the other file.
- *notfind.btm*: a script to display an error message box when a file is not found.
- *openx.btm*: a script capable to open, view, edit, or convert any files, according to the settings of configuration file `openx.cfg`.
- *pdf2txt.btm*: a script to convert `.pdf` file to text file.
- *pdffrag.btm*: a script to convert `.eps` figures to `.pdf` figures, with symbols replaced with LaTeX commands specified in a `.tex` file.
- *pdfmerge.btm*: a script to merge `.pdf` files into one `.pdf` file.
- *pdfnup.btm*: a script to convert `.pdf` file by placing several pages into one page.
- *pdfselect.btm*: a script to select or extract certain pages from a `.pdf` file.
- *pdfview.btm*: a script to view `.pdf` files, supporting most `.pdf` viewers such as SumatraPDF, PdfXCView, GsView, Acrobat Reader, and so on.
- *pdfview-s.btm*: a script to view `.pdf` files with forward searching feature, mainly supporting SumatraPDF.
- *pfshow.btm*: a script to view Type 1 fonts, i.e. `.pfb` / `.pfa` files.
- *picutil.btm*: a script to invoke picture utilities.
- *ppower.btm*: a script to post-process `.pdf` files to add movie effects generated by `pause` macro package.
- *preview.btm*: a script to preview multiple files.
- *ps2pdf.btm*: a script to convert `.ps` file to `.pdf` file.

- *psmerge.btm*: a script to merge `.ps` files.
- *pst2pdf.btm*: a script to produces `.pdf` files for all files of the form **-fig*.tex*.
- *pstex2eps.btm*: a script to convert `.pstex` file to `.eps` file.
- *pstex2jpg.btm*: a script to convert `.pstex` file to `.jpg` file.
- *pstex2pdf.btm*: a script to convert `.pstex` file to `.pdf` file.
- *psview.btm*: a script to view `.ps` / `.eps` files, supporting most PostScript viewers such as GsView , GS , RoPS , GsV .
- *regtool.btm*: a script to operate Windows registry.
- *res2dll.btm*: a script to convert `.res` file to `.dll` file via Delphi © compiler.
- *rtfview.btm*: a script to view `.rtf` file via the associated application.
- *run.btm*: a script to run an editable command.
- *run-edt.btm*: a script to run WinEdt ©commands.
- *runx.btm*: a script to ask for actions for given file, whose extension determines the possible actions.
- *search.btm*: a script to search for an executable file.
- *set_msg.btm*: a script to set an internal environment variable *_MSG*.
- *setclatex.btm*: a script to show a dialog for customize the options of smart compilation.
- *setemtex.btm*: a script to set environments for using EmTeX .
- *setjava.btm*: a script to search or set the path of *java.exe*.
- *setlang.btm*: a script to set up the language interface of $\mathcal{M}$TEX.
- *setproxy.btm*: a script to set the proxy server for commands including wget , curl and svn .
- *setttfpk.btm*: a script to set environment variables for program ttf2pk .
- *spell.btm*: a script to detect and invoke available speller shipped with $\mathcal{M}$TEX, supporting 4spell , aspell , ispell , amspell , Word-Spell , WPS-Spell , and WinEdt-Spell .
- *striptex.btm*: a script to strip line comments in TeX files.

- *svn-checkout.btm*: a script to emulate *svn checkout* command without installing utility svn .
- *t2h.btm*: a script to convert text file to HTML file.
- *t2l.btm*: a script to convert text file to LaTeX file.
- *t2r.btm*: a script to convert text file to .rtf file.
- *tcstart.btm*: a script to be called before any other batch scripts, mainly preparing necessary environments for MTeX.
- *testspeed.btm*: a script to test speed of specified servers.
- *tex_cmd.btm*: a script to determine the proper TeX engine of a .tex file.
- *texscan.btm*: a script to preprocess figures included in the TeX file by scanning contents of TeX file.
- *tpx2eps.btm*: a script to convert .tpx image file to .eps image file.
- *tpx2jpg.btm*: a script to convert .tpx image file to .jpg image file.
- *tpx2PDF.btm*: a script to convert .tpx image file to .pdf image file.
- *tpxscale.btm*: a script to process .tpx file so as to make it scalable by any factor defined in TeX file.
- *txt2dvi.btm*: a script to convert text file to .dvi file.
- *txt2eps.btm*: a script to convert text file to .eps file.
- *txt2img.btm*: a script to convert text file to image file of any format.
- *txt2pdf.btm*: a script to convert text file to .pdf file.
- *txt2ps.btm*: a script to convert text file to .ps file.
- *un_inst.btm*: a script to uninstall MTeX utility if un-installer found.
- *unbib.btm*: a script to post-process .bib file generated by BibEdit so as to use Chinese references.
- *uninstall.btm*: a script to uninstall MTeX (removing temporary folders and changes to the registry).
- *unix2dos.btm*: a script to convert Unix text file to DOS text file.
- *unknown_cmd.btm*: a script to be invoked when unknown command found in the MTeX DOS prompt.

- *upd_map.btm*: a script to update map files in $\mathcal{M}$TEX.
- *upd_mtex.btm*: a script to update $\mathcal{M}$TEX components from servers.
- *updafm.btm*: a script to update `.afm` files from `.pfb` files in $\mathcal{M}$TEX.
- *updpkg.btm*: a script to update the list of installed macro packages.
- *updtfm.btm*: a script to update `.tfm` files for fonts in $\mathcal{M}$TEX.
- *updvf.btm*: a script to update `vf.cfg` from `.vf` files in $\mathcal{M}$TEX.
- *userutil.btm*: a script to ask user to choose from user-defined user utilities.
- *util.btm*: a script to search or download-and-install-on-the-fly one utility.
- *view.btm*: a script to view `.dvi` file using dviscr , only for old EmTeX .
- *viewfont.btm*: a script to view any font file.
- *virfnt.btm*: a script to display real font name of a virtual font.
- *w-close.btm*: a script to close windows with certain title.
- *writable.btm*: a script to check whether a file/folder is writable.

5.2 Useful $\mathcal{M}$TEX Tools

TMac: Template and Macro Pad This small tool can help users to insert templates or code snippets to editor. This tool is fully configurable by editing the configuration file *tmac.ini*. Once a symbol is clicked, its corresponding code will be put into the clipboard and inserted into the active editor window. Hence this tool can be used with any editor. We have provided many templates and macros in the default configuration file, and two groups of HTML codes snippets. Besides normal code insertion, we have also implemented some unique special features, for example, it is possible to launch certain program by clicking an icon; or it is possible to pop up a color dialog so as to insert RGB values of selected colors. Therefore, this small tool can also serve as a small floating toolbar and a color picker for all applications.

BibX: Reference Extractor This small tool can help users to extract bibitem in BIBTEX format from some text containing a reference. This tool is very useful to generate bibitem from searching references in database like Web of Science © and

Ei Village ©. This tool is also configurable to add more formats of references. Its principle is to compare the text with each format defined in the configuration file, and generate the bibitem via the most matchable format.

Figure 11: Snapshot of BibX: one small reference extraction tool

MTEX-BMP: LATEX Bitmap Tool This small tool can help users to generate bitmap image from LATEX codes so as to use such image in any Windows © application like WinWord © or PowerPoint ©. This feature is very useful to "embed" powerful and beautiful LATEX mathematics typesetting in Windows applications. Its principle is to compile the LATEX codes, then convert `.dvi` to `.ps` format, and then convert `.ps` to bitmap image and put it in the clipboard, which will be then sent to the specified application window. Note that this tool can not only help to make PowerPoint © slides, but also help other applications to insert LATEX equations.

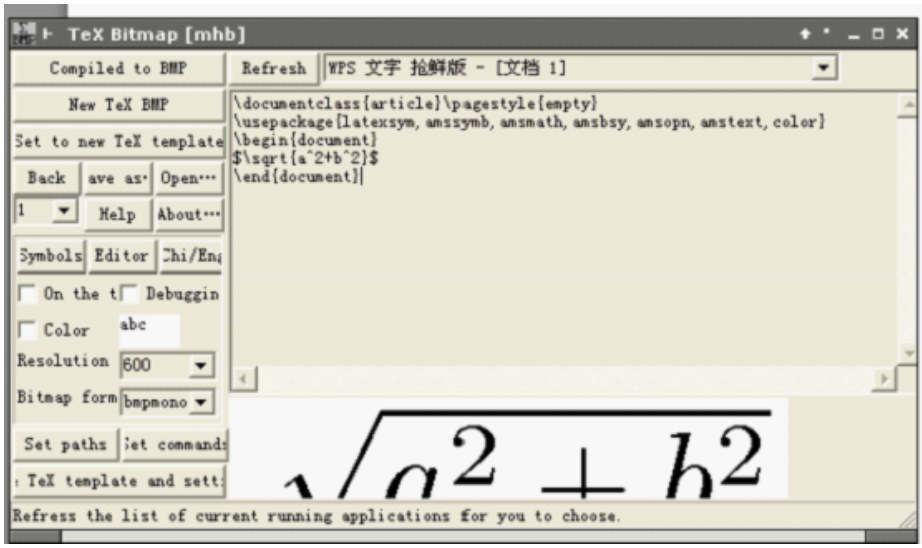

Figure 12: Snapshot of MTeX-BMP: using LaTeX for Windows applications

Net_Pkg: File or Package Downloader This small tool is used to search and download files from CTAN. During the compilation of TeX files, if a macro package is missing, $\mathcal{M}$TEX will launch a script *make-tex.btm*, which will search the missing macro file in the servers of $\mathcal{M}$TEX and then invoke this package downloader if server searching fails.

Figure 13: Snapshot of Net_Pkg: File or Package Downloader

UtilsMan: General Utilities Manager This tool is used to help users use various utilities with any text editor. Note that not all text editors provide feature of launching external tools or configuration of tools menu, hence generally it is very inconvenient to use LaTeX without a proper text editor. To resolve such a problem, this tool is invented to provide an external tools menu for all editors, even for notepad in windows. For example, after opening a `.tex` file in UtilsMan, we can select "Smart Compilation" from the drop-down menu of this tool to compile the `.tex` file. With this tool, it is not necessary to configure most text editors, and the users can use any editor as the default MiKTeX editor for editing `.tex` files.

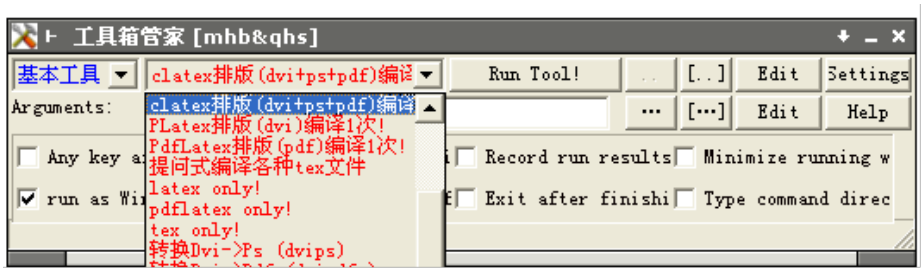

Figure 14: Snapshot of UtilsMan: external powerful tools menu for any text editor

M-Timer: Mini Timing Tool This tool is very helpful for timing reminder during rehearsal of slides.

5.3 Other Components

In the typical $\mathcal{M}$TEX installation, besides the $\mathcal{M}$TEX kernel, the following components are provided:

- Almost all standard macro packages in CTAN are provided in the compact form. Only macro files (e.g. **.sty*,**.cls*,**.cfg*) are included while their documents are packed as document archives and put on the servers of $\mathcal{M}$TEX for possible download-and-install-on-the-fly later. For example, typing *doc listings* in the $\mathcal{M}$TEX DOS Prompt will view the document after download-and-install-on-the-fly for document *listings.pdf* if it is not available in the local documents folder. It is also convenient to check all local documents and server documents via the *$\mathcal{M}$TEX Main Menu*.
- Almost all macro packages made by Chinese TEXers are provided also with brief usage introduction.
- Some selected documents for beginners (such as *lshort.pdf*) are provided in the *doc* folder of $\mathcal{M}$TEX. All local documents can be accessed directly by invoking *$\mathcal{M}$TEX Main Menu*/*$\mathcal{M}$TEX Documents*.
- To help users, a specific *demo* folder is provided in $\mathcal{M}$TEX so as to provide many simple TeX files for illustrating the straight-forward use of TEX, LATEX, and many macro packages.
- Some selected fonts are shipped with the typical installation, while most other fonts which are not likely to be used in daily work are packed and placed on the servers of $\mathcal{M}$TEX for possible download-and-install-on-the-fly later. For example, with the default installation, during the compilation of this article, the compiler requests for font *lmss12*, whose `.tfm` file cannot be found, hence $\mathcal{M}$TEX will search it in the font database file *fonts_db.cfg* and discover this font file belongs to lm (Latin Modern) font family, then $\mathcal{M}$TEX will try to download-and-install-on-the-fly lm font family which makes later compilation okay after automatic configuration of lm fonts. Note that lm font family is very large and not needed by most LATEX files, we do not put

it in the typical installation although XeTEX and ConTEXT users may highly depend on this font family.

– Main components of Web2C are included in the typical installation so as to provide basic TEX engines (*tex*, *latex*, *pdftex*, *pdflatex*) and command-line utilities (such as *metafont*, *dvips*, *ttf2pk*, *gftodvi*, etc.). Other TEX engines and utilities are packed and placed on the servers of $\mathcal{M}$TEX for possible download-and-install-on-the-fly later. For example, when a user tries to do *smart comilation* for demo file *mtex\demo\xetex\example-1.tex*, $\mathcal{M}$TEX will automatically detect that this file needs *xelatex* to compile it while XeTEX is not shipped with the typical installation, hence $\mathcal{M}$TEX will download and install XeTEX component on the fly and then use this engine to compile the document successfully.

– A customized Ghost Script as well as GsView are provided in the typical installation.

– The following selected utilities are shipped with the typical installation:

  - Aspell [34]: the default spell checker which can be used in any text editor.
  - Bibedit [35]: one simple reference management program to generate `.bib` files.
  - Dviwin [31]: the default `.dvi` viewer with many features.
  - Gnuplot [36]: one powerful scientific drawing software by scripts, used also by some other $\mathcal{M}$TEX utilities such as Rlab [37].
  - IrfanView [38]: one small picture viewer and converter, providing arbitrary image file conversion.
  - l2h [39]: one component to convert LATEX to HTML (web page).
  - l2r [40]: one component to convert LATEX to `.rtf` file (Word © document).
  - latexmac : a tiny tool to insert LATEX commands or symbols.
  - metapost [41]: a small powerful drawing program to generate PostScript figures.
  - ppower [15]: a small java application to assist the slides making with macro package pause.sty .

- RedMon [33]: a small utility to provide free `.pdf` and `.eps` printers by the help of GhostScript for converting any document to `.pdf` or `.eps` files in any Windows applications.
- SumatraPDF [32]: the default `.pdf` viewer capable of inverse searching.
- TeXaide [42]: a small utility to help LaTeX beginners to typeset formulas in the way of Equation Editor like in Microsoft Office.
- TpX [43]: a small drawing utility for most drawing jobs.
- x2l [44]: a small plugin of Excel © to help Excel © users to generate LaTeX tables from Excel © tables.

6 Sc1IDE: All-In-One IDE

Currently, the default editor in $\mathcal{M}$TEX is Sc1IDE , or All-In-One IDE , which is developed based on free software SciTE and mainly maintained by the author and two another researchers in China.

6.1 Brief Introduction

Sc1IDE is released as a free open-source software, whose source codes can be found from http://code.google.com/p/scitelatexide. The initial name of Sc1IDE was SciteLatexIDE , which was coined by *Instanton*[45], who made some changes and special configurations to enhance the official SciTE so that it can be more suitable for editing and compiling TEX files as well as using some related tools conveniently. Later, the author and another researcher, *Hongsheng Qi*, took over the job of enhancing and maintaining this software. We made significant improvements to previous *SciteLatexIDE*, and rename it to *Sc1IDE*, or *All-In-One IDE*, to reflect the nature that it aims to be a general-purpose text editor and integrated development environment which is suitable for TEXing, programming, web design and so on, supporting most file types as well as compilers and tools.

Roughly speaking, *Sc1IDE* not only keeps all features of SciTE [46], but also incorporates most enhancements made by SciTE-Ru [47], and it adds more unique features for TEXing and programming jobs. We made many efforts to make this small text editor as powerful as other editors and easy to use by providing preconfigured settings for TEX files and many programming languages in unified

ways. In this section, due to the page limit, we only introduce some features of Sc1IDE by example.

6.2 Main Features

Briefly speaking, Sc1IDE has the following main features:

- Customizable locales;
- Support Unicode encoding;
- Customizable tools menu even submenus;
- Customizable toolbar buttons;
- Customizable keyboard shortcuts;
- Multi-buffer editing;
- Row block and column block operations;
- Output buffer for running commands;
- Richful command-line arguments;
- Customizable language support;
- Customizable syntax highlight;
- Customizable code folding;
- Customizable code auto-completion;
- Customizable code API call-tips;
- Customizable abbreviation expansion;
- Built-in lua [48] scripting;
- Customizable lua extensions;
- Regular expression searching and replacing;
- Full-screen editing;
- Editing macros support;
- Compilation error locating;
- Brace auto matching;

- Block or line commenting;
- Unique *Files* panel to show files in current folder, favorite files, and project files;
- Unique *Outline* panel to show structure and bookmarks of current file;
- Unique *Abbrev* panel to show available abbreviations and code completion API;
- Unique *Docs* panel to show classified help documents or on-line documents and even searching engines;
- Unique *Ltx-Labels* panel to show labels, bibitems, and included filenames in current file;
- Unique *Ltx-Cmds* panel to show insertable LaTeX Greek commands, environments, mathematics functions;
- Unique integrated debugging for *C/C++*,*Pascal*,*C#*,and *Lua* with the help of gdb [49]/mdb [50];
- Unique integrated subversion version control;
- Unique LaTeX block compilation;
- Unique customizable F1 keyword help;
- Unique embedded expression calculator;
- Unique E-book mode for viewing or reading files;
- Unique preconfigured monofont schemes for programming jobs;
- Unique Hex editing mode for editing arbitrary files;
- Unique word counting for both ASCII files and Chinese files;
- Spell checking by internal or external spell checkers;
- Many additional features provided by lua scripts.

Among these features, we need to remark that the abbreviation expansion is very convenient. For example, with Sc1IDE , typing *eq* followed by hot key *Ctrl+B* will generate an empty *equation* environment, similarly *itm* can expand to an empty *itemize* environment, *fig* can expand to an empty *figure* environment, and so. Note that the abbreviation settings can be configured for each file type, and the users can arbitrarily add new abbreviations or modify existing abbreviations.

6.3 TEXing Support

As to TEXers, we have some special features for happy TEXing:

- Automatic brace completion, e.g. completing `{` by `}`, completing `\left(` by `\right)`.
- Automatic environment completion, e.g. completing `\begin{xyz}` by `\end{xyz}`.
- Automatic ConTEXT command completion, e.g. completing `\starttext` by `\stoptext`.
- Automatic inserting matching `$` when typing `$`.
- Automatic quote replacement, e.g. typing `"` yielding ‘‘ and ’’ in turn.
- Automatic inserting braces for mathematics typesetting when typing `_` or `^`, e.g. typing `_` yielding `_{}` with cursor inside the braces.
- Customizable folding support for sectioning commands (like `\section`, `subsection`, etc.), environments (`\begin{...}` and `\end{...}`), code blocks (like `\if`, `\def`, etc.).
- Two useful sidebar panels for LATEX labels, references, subfiles, commands.
- Easy inserting of label references and citations, e.g. clicking the braces of `\ref{}` or `\cite{}` yielding a pop-up list of defined labels or found bibitems for selection.
- Integrating support to more TEX engines such as XeTEX.
- Integrating many tools related with LATEX in the *Tools* menu, e.g. converting LATEX file to HTML or RTF file.
- Smart compilation for TeX files.
- Support for compiling selected text only.
- Switching between TeX file and log file.

7 Other Addons of $\mathcal{M}$TEX

With $\mathcal{M}$TEX, we do not only provide essentially necessary tools for TEXing, but also provide many other utilities which are unlikely to be included in other TEX

distributions. All the utilities provided in $\mathcal{M}$TEX were carefully chosen, and most of them are less than 2 Megabytes if packed with Rar .

The utilities provided in $\mathcal{M}$TEX can be roughly classified into the following categories:

- Picture viewing and converting: for example, Irfan View [38], XnView [51], etc.
- Picture drawing and scientific drawing: for example, TpX [43],TeXCAD32 [52], GnuPlot [36],Asymptote [53],Kseg [54],GraphViz [55],JsPlot ,EDraw , PhotoFiltre [56], and so on.
- `.dvi` / `.ps` / `.pdf` file viewers: for example, DviOut [57], MuPdf .
- `.pdf` tools: for example, PdfTk [58], xpdf [59].
- References management: for example, BibDB [60], JabRef [61].
- Equation editing: for example, LatexMac , TeXaide [42], EqmLite [62].
- Scientific computing: for example, Rlab [37], Yacas [63].
- Version control: for example, SVN [64], RapidSVN [65], CVS [66].
- Demo making: for example, Wink [67], InstantDemo [68]©.
- Packing and unpacking: for example, Rar [69], Wim [70], Upx [24].
- Embedded system compiler: for example, C51 [71],SDCC [72],Arm-Gcc ,Avr-GCC .
- Compilers and interpreters: for example, MinGW [73], Tiny C Compiler [74],Lua [48], Perl [75].
- Code formators: for example, Astyle [76], Uncrustify ,Ctags .
- Spell checkers: for example, Aspell [34], Ispell [77], 4Spell [78].
- Font utilities: for example, FontViewer [79], TypoGraf [80].
- Misc utilities: for example, Zoomer , Mempad [81], Qemu [82], Commander [83].
- More useful utilities of other types.

Most third-party utilities can be accessed by invoking *$\mathcal{M}$TEX Main Menu/[Choose User Utils]*. The utilities in this menu can be customized in configuration file

`utils.cfg`, which defines possible editors, `.dvi` / `.ps` / `.pdf` viewers, spell checkers, converters, user utilities, and so on. Note that the menu of *User Utilities* can also have configured submenus, which make hundreds of utilities well organized in simple and elegant way.

Figure 15: Snapshot of Choosing User Utilities in $\mathcal{M}$TEX

Listing 2: Configuration example of `utils.cfg`

```
[Utils]
Editors=Sc1IDE/WinEdt/EditPlus/Sc1/SciTE/ED/...
DviViewers=#Auto/DviWin/Yap/Dviout/WinDvi/CCTWin32/...
```

```
PsViewers=#Auto/GsView/RoPS/PsV/Gs/Ps2pdf/Open/...
PdfViewers=#Auto/SumatraPdf/MuPdf/Open/GsView/PsV/Gs/...
SpellCheckers=4Spell/ASpell/ISpellw/ISpell/AmSpell/...
PicUtils=TpX/MDraw/PageDraw/TkPaint/LatexCAD/TexCad32/
    TeXCad/...
Converters=Gconvert/GS_convert/ltx2txt/txt2ltx/.../?
DefUserUtils=M_Timer/LyX/LatexMac/TeXaide/BibEdit/WBibDB/
    JabRef/...
UserUtils=office:[Office]/edit:[Editors]/draw:[DrawiSystem
    ]/bib:[References]/eq:[Equations]/math:[Mathematics]/vcs
    :[Subversion]/demo:[DemoMaking]/tv:[TV]/media:[Players]/
    arc:[Archives]/browser:[Browsers]/im:[Chatting]/game:[
    Games]/dev:[Programming]/emb:[Embedded]/%DefUserUtils
Formats=tex/etex/latex/ptex/platex/pdftex/pdflatex/xetex
    /...
[Menus]
menu.misc=MemPad/ICalClk/M_Timer/Zoomer/Lingoes/...
menu.spell=FreeSpell/ProSpell/%SpellCheckers
menu.math=Rlab/FreeMat/MathViews/MLAB/Jmath/Yorick/SysQuake
    /...
menu.vcs=RapidSVN/SVN_Checkout/SVN/CVS
menu.sys=Commander/QEmu/UltraISO/Everest/...
menu.bib=BibEdit/BibDB/WBibDB/JabRef
...
[Commands]
```

Note that any utility (say xyz) can be easily invoked via command like *util xyz* in the $\mathcal{M}$TEX DOS Prompt, which will invoke *add_util.btm* to start download-and-install-on-the-fly if the utility is not installed with $\mathcal{M}$TEX.

8 Additional Notes

Users of $\mathcal{M}$TEX may send suggestions, comments, or bug reports to `mtex-suite@googlegroups.com` or submit/reply posts in $\mathcal{M}$TEX-Suite Googlegroup[84]. Users of $\mathcal{M}$TEX are suggested to subscribe to $\mathcal{M}$TEX-Suite Googlegroup by sending an

email to mtex-suite+subscribe@googlegroups.com. After subscription, users will be able to receive latest updates or messages on using $\mathcal{M}$TEX, and can also post questions or suggestions in using $\mathcal{M}$TEX or LATEX or XETEX or any meaningful related things. Usually, the authors of $\mathcal{M}$TEX or other $\mathcal{M}$TEX users may help to answer the questions soon. The official website[1] of $\mathcal{M}$TEX is still under construction and it will be updated soon with a new release in year 2012. And the users can find more personal information of the author on the author's homepage [85].

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