

AxMath Help

A Professional Equation Editor & Calculator

$$\iint_D \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} \right) dx dy = \oint_L P dx + Q dy$$

$$a^2 + b^2 = c^2$$

$$e^{i\pi} + 1 = 0$$

$$E_0 = mc^2$$

$$\mathbf{F} = m\mathbf{a}$$

$$y = \lim_{\Delta x \rightarrow 0} \frac{\sin x}{x}$$

$$= \lim_{\Delta x \rightarrow 0} \frac{\cos x}{1}$$

$$d = 12.5$$

$$A = \frac{\pi d^2}{4} = 122.71846303$$

$$I_z = \frac{\pi d^4}{64} = 1198.42249054$$

$$> \approx \cup \oplus \subseteq \in \notin$$

$$c = \pi r$$

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\begin{cases} \oiint_S \mathbf{D} \cdot d\mathbf{s} = Q_f, \oiint_S \mathbf{B} \cdot d\mathbf{s} = 0 \\ \oint_L \mathbf{E} \cdot d\mathbf{l} = -\frac{d\Phi_B}{dt}, \oint_L \mathbf{H} \cdot d\mathbf{l} = I_f + \frac{d\Phi_D}{dt} \end{cases}$$

$$i\hbar \frac{\partial}{\partial t} \Psi(r,t) = \hat{H} \Psi(r,t)$$

$$\hat{f}(\xi) = \int_{-\infty}^{\infty} f(x) e^{-2\pi i x \xi} dx$$

$$1 + 1 = 2$$

$$p = \hbar k$$

$$E = \hbar \omega$$

$$x_0 = 30, y_0 = 20, \alpha = 30^\circ$$

$$x_1 = x_0 \cos \alpha - y_0 \sin \alpha = 15.98076211$$

$$y_1 = x_0 \sin \alpha + y_0 \cos \alpha = 32.32050808$$

$$\begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{pmatrix}$$

$$E = \sum_{i=1}^n x_i P_i$$

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1. AxMath Installation

To install AxMath, exit AxMath, MS Word and PowerPoint, then run the AxMath setup program and follow the instructions in the dialogs.

The first version of AxMath was released at the end of 2014, and the antivirus software may be sensitive to a new software. The installation package downloaded from our official website (<http://www.amyxun.com>) is guaranteed being secure. To ensure security, you can use antivirus software to scan the installation package before installation.

The installation and running of AxMath requires to read and write the system's registry, if the antivirus software alarm for that reason, please select "Allow all operations" or a option like that.

If at any time you need to uninstall AxMath, simply click on the Uninstall icon located in the AxMath program directory. The uninstalling also need to exit AxMath, MS Word and PowerPoint.

System Requirements : Windows 7 and newer, including Windows 10.

2. Introduction

AxMath’s main interface can be set to “workspace + toolbox panel + right sidebar” mode or “workspace + LaTeX editor + right sidebar” mode. The right sidebar provides memo-board, tile-wall and equation library, it can be turned on or off as required.

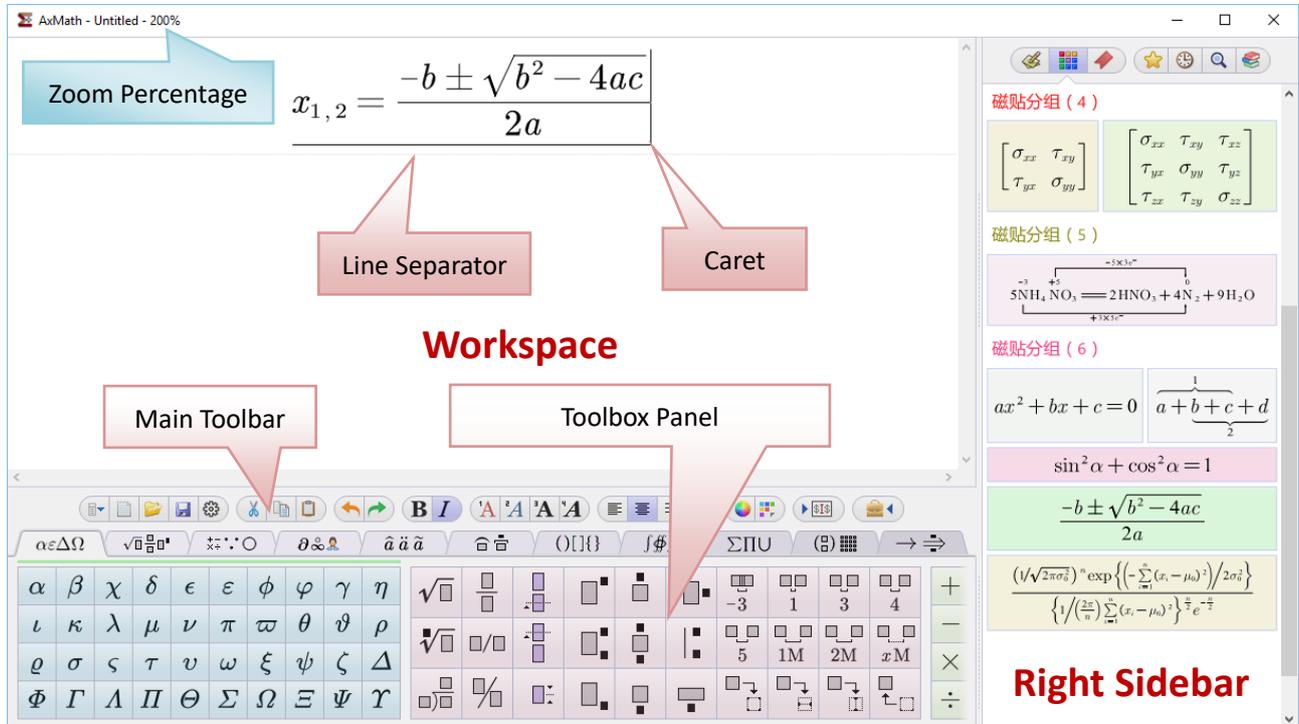


Fig.2.1 Mode 1: workspace + toolbox panel + right sidebar

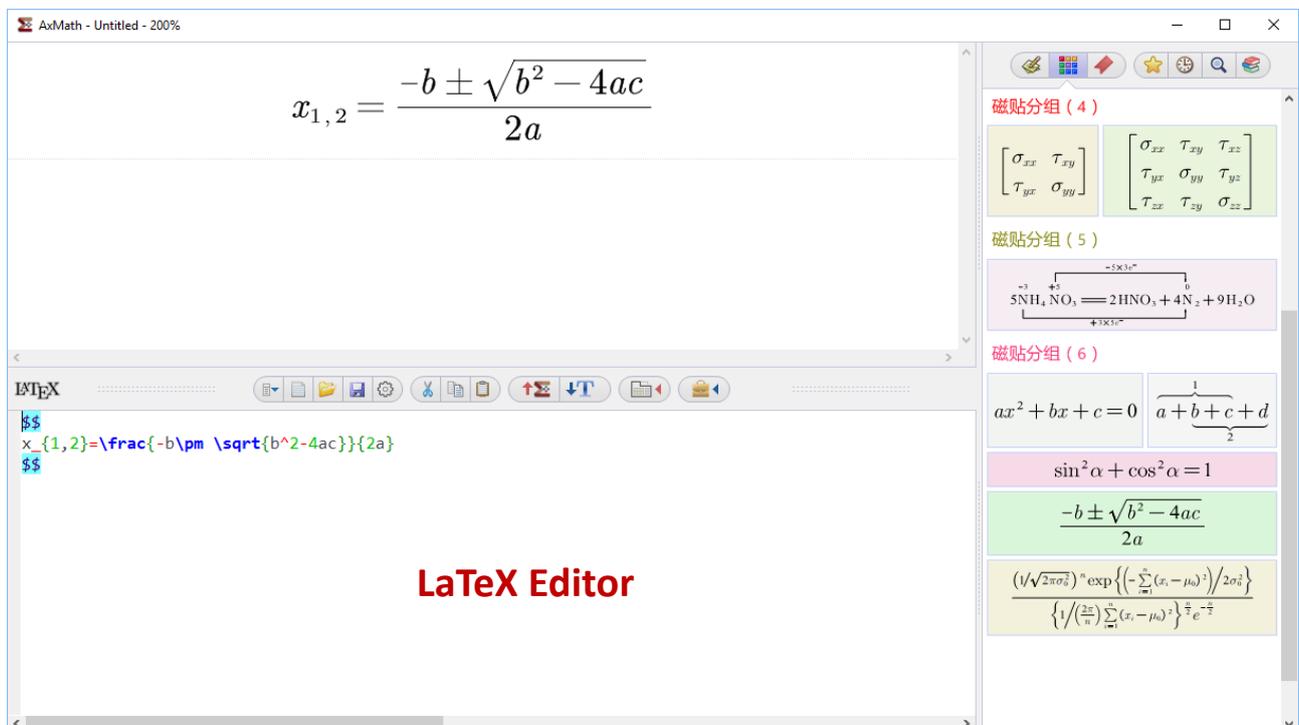


Fig.2.2 Mode 2: workspace + LaTeX editor + right sidebar

Editing & Typesetting

What you see is what you get

Graphical typesetting

A scrollable and customizable toolbox panel is applied to present all symbols and expression-building structures.

Hotkey input and interactive LaTeX input are both supported.

LaTeX editor with syntax highlighting is provided.

AutoComplete Suggestions for LaTeX.

Versatile assistants and gadgets on the right sidebar to improve working efficiency.

The equations' appearance conform to the AMS/LaTeX standard

User defined symbols

Matrix templates, auto-filling and partitioning for matrices

Searching and replacing

Colorful equations, automatically or manually

MS-Office plug-in for equation numbering and management

Scientific calculating function

Calculating based on equation

Variable and constant definition

Equation output and compatibility

AxMath is an OLE server. It works as a plug-in with word processors such as MS-WORD

The baseline of the surrounding text is aligned with the AxMath equation's baseline for many word processors

Vector output, can be used directly for printing or publishing

Can be exported to BMP, JPG, PNG, GIF and other common picture formats

Picture capture is supported

3. Editing

3.1 Basic Operations

3.1.1 WYSIWYG

WYSIWYG, means what you see is what you get, is the basic way to editing equations in AxMath. In the workspace of AxMath, you can edit equations just like editing text using a common text editor. You can insert special mathematic symbols or expression-building structures by clicking on buttons of the toolbox panel, or by pressing hotkeys, or by typing in LaTeX language.

A two-dimensional caret, as shown in Fig.2.1, blinks in the AxMath's workspace to indicate the current edit position. You can use the mouse click and Home key, End key, and the four direction keys to change the edit position.

3.1.2 Active Font Style

Check status of the buttons () decides the active font style, which may be regular, *italic*, **bold** or **bold-italic**. You can check them on/off by pressing the button or the hotkeys Ctrl+B and Ctrl+I respectively.

3.1.3 Change Font Style

If you want to change the font style of a segment of the existing text, select them firstly, then popup the right-click menu and select the corresponding command, or click on one of the toolbar buttons (), or press the hotkeys Ctrl+1~4.

3.1.4 Change the Workspace View with the Mouse Wheel

When the mouse cursor is inside the workspace area, you can scroll the view vertically by rolling the mouse wheel, or scroll the view horizontally by rolling the mouse wheel with the Shift key pressed, or zoom the view by rolling the mouse wheel with the Ctrl key pressed.

3.2 Toolbox Panel

In this document, all elements for building equations are divided into two classes: a) symbols that represent variables, matrices or vectors, function names, numbers, operators, labels, etc.; and b) expression-building structures that are subdivided into general Layout, script and limit, tabular math and elementary math schemata, etc. A expression-building structure typically has one or more sub fields as nests for child elements.

AxMath adopts a kind of scrollable toolbox panel to present all these symbols and expression-building structures, as shown in Fig.2.1. Any particular piece of equation can be built out of them.

3.2.1 Palettes & Buttons

All symbols and expression-building structures are categorized into 11 palettes. You can click on the category tab to select which one to be the current palette. When the mouse cursor is located inside the panel area, you can also change the current palette by rolling the mouse wheel.

When you click on a button of the panel, the corresponding mathematic symbol or

expression-building structure will be created at the caret position. You can also place a symbol or an expression-building structure to a desired position directly by drag-drop operation.

You can change the order of the palettes by using the right-click menu on the category tab.

3.2.2 Change the Appearance and Background Color

The appearance of the toolbox panel is customizable. To open the setting dialog, right-click on any one button of the panel and select “**Appearance...**” in the context menu. You can enable the check “**Using Large Icons**” in the dialog if you think the icons on the UI are too small.

You can also set a distinctive background color for each palette using the entry “Set Page Color” which can be found in the same context menu.

3.2.3 Re-mapping and Expanding

Some palettes of the toolbox panel, such as the category of binary operators, contain a large number of symbols and expression-building structures. To keep the interface clean and tidy, AxMath makes them collapsed. Only a part of symbols and expression-building structures, maybe the most commonly used, are pinned on the front interface. You can fetch all symbols by the tail button (). And you are also allowed to re-mapping the buttons of the collapsed pages. The re-mapping command can be found in the context menu.

3.3 Hotkeys

3.3.1 Define a Hotkey

Hotkeys, or keyboard accelerators, allow the users to input those special mathematic symbols or expression-building structures, that cannot be typed directly by keyboard, without clicking on the toolbox panel. You can assign a hotkey for any button of the toolbox panel. Right-click on any one button of the panel to pop up the context menu, then select the entry “**Set Hotkey**” to open the dialog for setting the hotkey.

Generally, a hotkey is made up of a primary key and a secondary key. The secondary key can be Ctrl, Alt, Ctrl+Shift, Alt+Shift or Ctrl+Alt+Shift. The primary key can be a character, a number, a punctuation or a direction key. The primary key is not case-sensitive.

Note: Some hotkeys are system reserved and should not be defined as custom hotkeys. For example, “Ctrl+C” is regularly to mean “**copy**”. See section 3.3.2 for more details about system reserved hotkeys.

If you forget which hotkey has been assigned to a button, just right-click on the button, the hotkey definition will be shown in the context menu. You can also review all user-defined hotkeys in the “**TeX Language & Hotkeys**” tab of the “**AxMath Settings**” dialog which can be opened by clicking on the toolbar button ().

3.3.2 Default Hotkeys

Key Definition				Function	System Reserved
			ESC	Erase Highlights of Search Results	Yes
			F1	Help	Yes
			F2	Save	Yes
			F3	String Find and Replace	Yes
Ctrl			F3	Find the Similar Segment	Yes
			F4	User Symbols	Yes
			F5	Re-calculate the Current Line	Yes
			F6	Re-calculate All Lines	Yes
			F7	Open the Right Sidebar	Yes
			Home	Move the Edit Position to the Line Head	Yes
			End	Move the Edit Position to the Line Tail	Yes
Ctrl			Enter	Save and Exit for OLE Server Mode	Yes
Ctrl			1	Modify Font Style of the Selected Text to Be Regular	Yes
Ctrl			2	Modify Font Style of the Selected Text to Be Italic	Yes
Ctrl			3	Modify Font Style of the Selected Text to Be Bold	Yes
Ctrl			4	Modify Font Style of the Selected Text to Be Bold-italic	Yes
Ctrl			A	Select All	Yes
Ctrl			B	Font Bold	Yes
Ctrl			C/X/V	Copy / Cut / Paste	Yes
Ctrl			G	Temporarily Switch to Greek Keyboard	Yes
Ctrl			I	Font Italic	Yes
Ctrl			N/S	New / Save	Yes
Ctrl			T	Copy Text	Yes
Ctrl			Y/Z	Redo / Undo	Yes
Ctrl			Tab	Switch Edit Mode	Yes
Ctrl			Home	Move Edit Position to the Document Head	Yes
Ctrl			End	Move Edit Position to the Document Tail	Yes
	Shift		Enter	Convert the Code in the LaTeX Editor to Equation	Yes
		Alt	C	Set the Color of the Selected	Yes
		Alt	Up	Insert a Row above the Edit Position, for Matrices	Yes
		Alt	Down	Insert a Row below the Edit Position, for Matrices	Yes
		Alt	Left	Insert a Column before the Edit Position, for Matrices	Yes
		Alt	Right	Insert a Column after the Edit Position, for Matrices	Yes
Ctrl		Alt	Up	Delete the Row above the Edit Position, for Matrices	Yes
Ctrl		Alt	Down	Delete the Row below the Edit Position, for Matrices	Yes
Ctrl		Alt	Left	Delete the Column before the Edit Position, for Matrices	Yes
Ctrl		Alt	Right	Delete the Column after the Edit Position, for Matrices	Yes
Ctrl			D	\circ	
Ctrl			F	$\frac{\square}{\square}$	
Ctrl			H	\square^{\square}	
Ctrl			J	\square_{\square}	
Ctrl			L	\square_{\square}	
Ctrl			P	π	
Ctrl			R	$\sqrt{\square}$	
Ctrl	Shift		I	\int_{\cdot}	
Ctrl	Shift		P	∂	
Ctrl	Shift		S	\sum	

3.4 Typing Greek Characters

Greek characters are very common in technical and scientific equations. Besides clicking on the toolbox panel, AxMath offers more ways to input Greek characters.

1. Switching the keyboard to the Greek mode temporarily by pressing “Ctrl+G”. Here the word “temporarily” means that after entering one Greek character, the keyboard will automatically restore to the original mode. Fig.3.1 shows the Greek keyboard layout. For example, press “Ctrl+G”, “d” and “e” in turn, and you will get “ δe ”.
2. Using the interactive LaTeX language, e.g. input “ $\backslash\alpha$ ”, and you will get “ α ” after pressing the Enter key. See section 3.5 for more details about LaTeX.

Q	W	E	R	T	Y	U	I	O	P
$\Theta \theta$	$\Omega \omega$	$E \epsilon$	$R \rho$	$T \tau$	$\Psi \psi$	$U \upsilon$	$I \iota$	$O \omicron$	$\Pi \pi$
A	S	D	F	G	H	J	K	L	
$A \alpha$	$\Sigma \sigma$	$\Delta \delta$	$\Phi \phi$	$\Gamma \gamma$	$H \eta$	$\Theta \vartheta$	$K \kappa$	$\Lambda \lambda$	
Z	X	C	V	B	N	M			
$Z \zeta$	$\Xi \xi$	$C \chi$	$\varsigma \varpi$	$B \beta$	$N \nu$	$M \mu$			

Fig.3.1 Greek Keyboard

3.5 LaTeX Language Support

TeX is a typesetting language invented in the late 1970's by Donald Knuth, a computer science professor of Stanford University. It is a powerful document processor, especially for documents containing equations. TeX is widely used for the production of technical and scientific documentation because of its exquisite effect in publishing, and also used by many web applications for equation presentations because it is easy to type in web forms. There are several branched versions of TeX, LaTeX, or AMS-LaTeX, being one of the most popular. Please visit <http://www.ams.org/publications/authors/tex/amslatex> for more information on AMS-LaTeX.

AxMath's translator is mainly based on AMS-LaTeX, but it is not very strict on syntax as other applications. Some commands originated from other branches, such as Mathjax, are also valid in AxMath. It is notable that AxMath is designed for processing equations, LaTeX commands those are not commonly used in math equations may be unrecognizable in AxMath.

The following is an example of LaTeX language for quadratic formula:

```
$$ \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} $$
```

And the corresponding equation would appear in AxMath's workspace:

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

There are several ways, including interactive LaTeX input, clipboard and a specially designed LaTeX editor, for equation conversion to and from LaTeX code.

3.5.1 LaTeX Editor

AxMath provides a LaTeX script editor. You can press the toolbar button () or the hotkey “Ctrl+Tab” to open the editor. In the editor, as shown in Fig.2.2. it is convenient to input LaTeX code with the assist of syntax highlighting, AutoComplete Suggestions.

You can press the toolbar button () or the hotkey “Shift+Enter” to convert the code to equations, or, conversely, press the toolbar button () to restore the equations to LaTeX code.

The editor allows you to set font and syntax highlighting scheme. You can right-click anywhere inside the editor, then select the command “**Text Editor Settings**” in the context menu to open the settings dialog. You can also find the entry in the “**TeX Language & Hotkeys**” tab of the “**AxMath Settings**” dialog which can be opened by clicking on the toolbar button ().

3.5.2 Interactive LaTeX Input

You can edit equations by typing in LaTeX language directly in the workspace, as shown in Fig.3.2. The string after the first “\”, “^” or “_” will be rendered in blue color, means that it is assumed to be a piece of LaTeX code. After pressing Enter key, the string will be replaced by the conversion result.

You can turn on/off the interactive LaTeX language in the “**TeX Language & Hotkeys**” tab of the “**AxMath Settings**” dialog which can be opened by clicking on the toolbar button ().

$$\backslash \text{frac}\{-b \pm \sqrt{b^2 - 4ac}\}{2a}$$


$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Fig.3.2 Edit Equations with interactive LaTeX language

3.5.3 AutoComplete Suggestions

AutoComplete Suggestions make it easier to type equations in TeX language. In AxMath, when you type a “\”, indicating that you will input some LaTeX code in the following, a prompt bar will pop up. AxMath suggests candidates according to the string nearby the caret and displays them in the prompt bar, as shown in Fig.3.3. You can select a candidate by pressing Space key, numeric keys or mouse clicking to complete the LaTeX code automatically. If you do not intend to select a candidate from the prompt bar, just press Enter key to ignore it, or press ESC key to close the prompt bar. Users can use the arrow keys, the PgUp/PgDn keys, and the comma/dot keys to turn the page of the prompt bar.

If you do not need this feature, you can turn it off in the “**TeX Language & Hotkeys**” tab of the “**AxMath Settings**” dialog which can be opened by clicking on the toolbar button ().

object containers (such as MS-WORD).

3.7.2 Copy Text

You can cut or copy text from the LaTeX editor in a regular way.

To copy LaTeX code from the workspace, select all or a piece of equation, then right-click and select the entry "**copy text**" from the context menu. This is convenient for those who frequently need insert equations, represented by LaTeX code, to a TeX script document. The hotkey for this operation is Ctrl+T.

3.7.3 Paste

When a paste (Ctrl+V) command is triggered in the workspace, AxMath will do a format check and a conversion, if necessary, before pasting data to the caret position. If the clipboard contains the OLE data object, The pasting will continue normally. Else if the clipboard contains text, AxMath will try to convert it in LaTeX syntax. If the conversion succeeded, the conversion results will be pasted to the caret position. Otherwise, the plain text will be pasted.

3.7.4 Drag-drop

Drag-and-drop operations typically involve two parties: a drag source from which the dragged object originates and a drop target which receives the dropped object. In AxMath, the workspace and the right sidebar can act as both the drag source and the drop target, while the symbol panel can only be the drag source.

AxMath supports several drag-drop operations as the following list:

1. Drag from the toolbox panels to the workspace.
2. Drag from the right sidebar (the memo-board, the tile-wall and the equation library) to the workspace.
3. Drag from the workspace to the right sidebar, i.e, to create a new item for the memo-board, the tile-wall or the equation library. If the Ctrl key is pressed during the process, the content of the drop target will be replaced by that of the drag source, instead of to create.
4. Drag and drop inside the workspace, i.e, to move the selected part from one position to another. If the Ctrl key is pressed during the process. The selected part will be duplicated to the target location, instead of being moved.
5. Drag and drop inside the memo-board, the tile-wall or the equation library, i.e, to move a item from one position to another.
6. Drag from AxMath, including workspace and the right side panel, to a MS-Word document or other OLE containers, or vice verse.

3.8 Gadgets on the Right Sidebar

The right sidebar of AxMath is consist of the memo-board, the tile-wall and the equation library. The three gadgets basically work on the same principle. However, there are differences in the mode of operation. Each one of them is fundamental to make up the whole versatile toolkit on the right sidebar. The toolkit helps to greatly improve your work efficiency.

The right sidebar can be shown or hidden by clicking ton the toolbar button () or by

pressing the hotkey “F7”. The three gadgets share the same display space of the right sidebar. Click on one button of the right toolbar () to choose which one to be shown.

3.8.1 The Memo-board

The memo-board of AxMath works like a multi-frame clipboard. Every time you do a cutting or copying operation, the memo-board creates a new item from the clipboard data, and insert it to the list in reverse chronological order. You can also create a new item for the memo-board by drag-drop from the workspace, as mentioned in section 3.7.4.

The contents of the items in the memo-board can be pasted to the workspace by drag-drop or double click. You can export the tile-wall to a file and reload it when necessary.

The size of the memo-board (maximum number of items) can be customized. You can also make the memo-board to record input history. These options can be found in the “**Advanced**” tab of the “**AxMath Settings**” dialog which can be opened by clicking on the toolbar button ().

3.8.2 The Tile-wall

The tile-wall of AxMath is designed to store some equation segments which are short but repetitively used. In contrast to the memo-board and the equation library, the tile-wall arranges items more compactly, and supports hotkey and TeX macro definition.

To create, move or update a tile item, please refer to section 3.7.4. You can export the tile-wall to a file and reload it when necessary, as well as the memo-board.

You can set a distinctive color for each one tile, and make simple classifications by adding labels among the tiles. All these entries can be found in the context menu. As you can see, context menus are employed almost everywhere in AxMath. Whenever you want to do something but can not find the toolbox or button, try right-clicking.

3.8.3 The Equation Library

AxMath provides a large mount of equations for your reference. They are catalogued and detailed classified in the equation library. Here you can browse equations, search a equation by keywords and learn about the relevant of the equations, and certainly, insert them to the workspace as you need.

The equation library applies a tree list to make it easier to retrieve equation items, as shown in Fig.3.4.A. You can click on the button () to open the tree list. In the tree list, each root node acts as a book case, each leaf node links to a book page, and each middle node may be a book, a chapter or a section, depend on its level in the tree list.

You can open the equation search engine by the button (). Keywords for the search engine can be “Newton”, “Euler” or “Common-used integral”, “Ordinary differential equation” and so on.

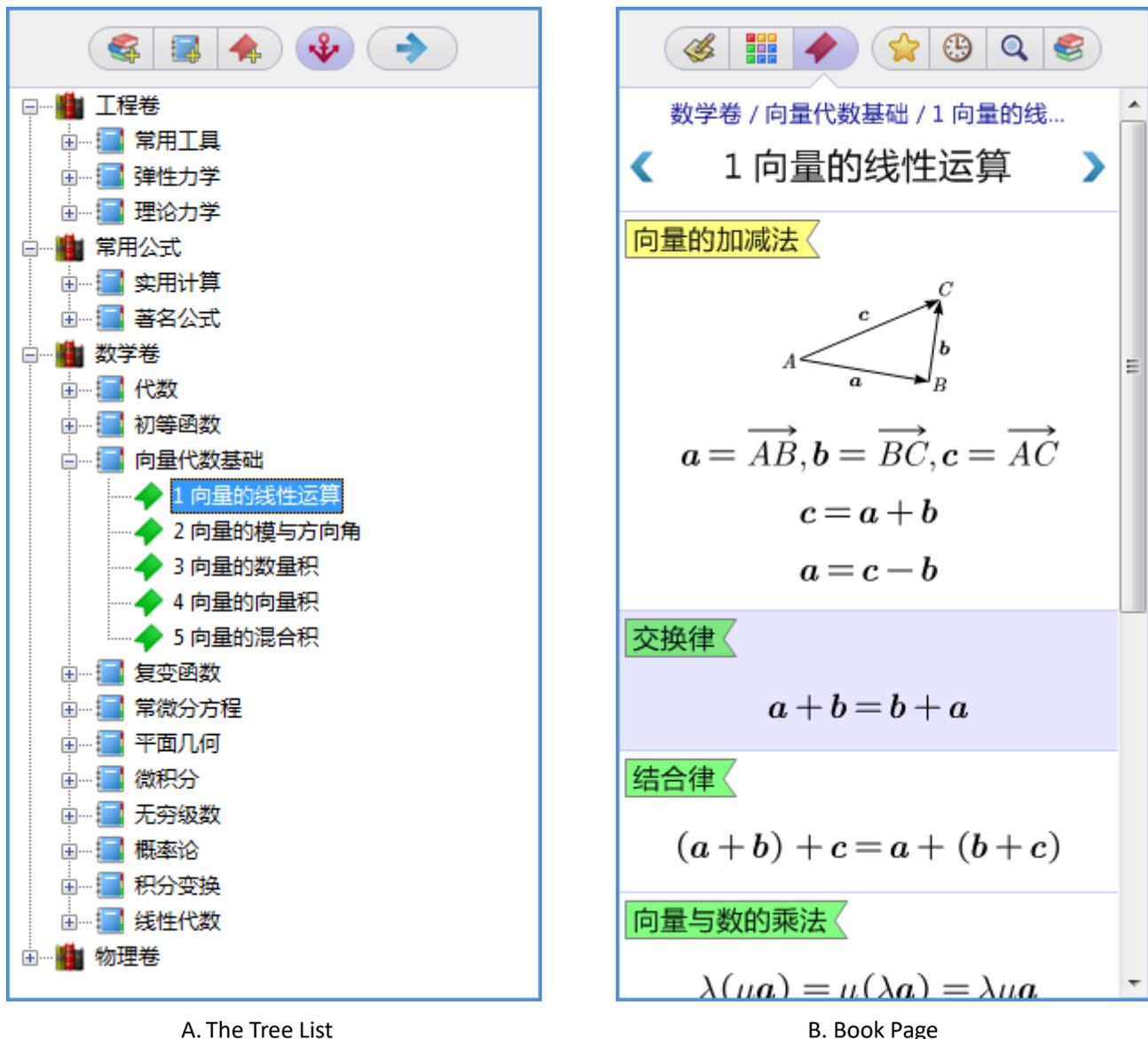


Fig.3.4 The Equation Library

AxMath also presents a favorite list () and a recent list () to help you fetch your most frequently-used book pages fast. Right-click on a book page, as shown in Fig.3.4.B., you can find the entry “Favorite” in the context menu.

The tree list works just like the Windows Explorer. All edit commands for the tree list can be found in the context menu, and the toolbar () provides some commonly-used functions.

You can use the drag-drop method that described in section 3.7.4. to create, move or update an item in book pages. Furthermore, you can open the “**Entry Title, KeyWords and Figure**” dialog by the context menu and edit the title, the keywords and the figure of an item.

Note: Every time you re-install AxMath, the equation library will be reset. So you may need to backup the equation library before re-installing a new version of AxMath.

3.9 Find and Replace

3.9.1 String Search and Replace

To open the “**String Search and Replace**” dialog, right-click on the workspace, and then select the command in the context menu, or press the hotkey "Ctrl+F3".

You can format the replacement with a special font style. That is useful since there are usually strict requirement on font style of the symbols in science equations.

3.9.2 Find the Similar Segments

You can search all the same segments as the selected in the workspace by the “**Find the Similar Segments**” command in the context menu, or pressing the hotkey “F3”. This function can be used to search any type of symbol and expression-building structure, while the “String Search” method mentioned in section 3.9.1 can only used for normal strings.

3.9.3 A Flexible Replacement Method to all Find Results

You can replace all find results with the selected segment in the workspace, an item from the gadgets of the right sidebar, or a basic element of the toolbox panel. The corresponding command entry is available in their context menu. The tutorial E-05, in chapter 9, illustrates how it works.

3.9.4 Erase Find Results Highlight

All the find results will be highlighted with lightgreen background color. You can erase the highlight using the context menu or just by pressing ESC key.

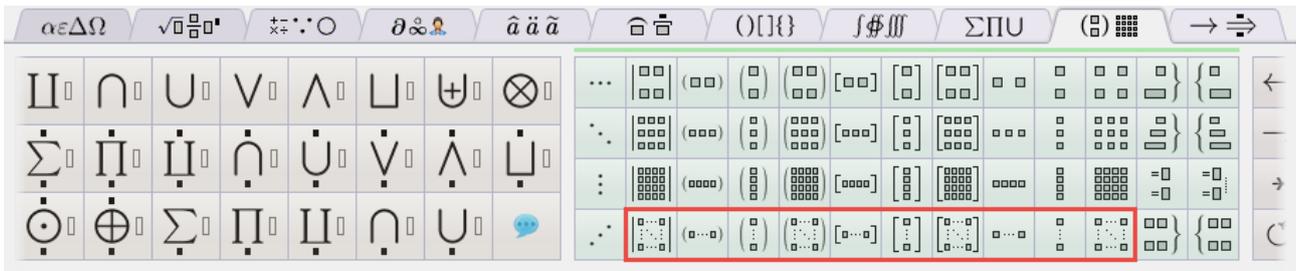
3.10 Matrix

3.10.1 Create a Matrix

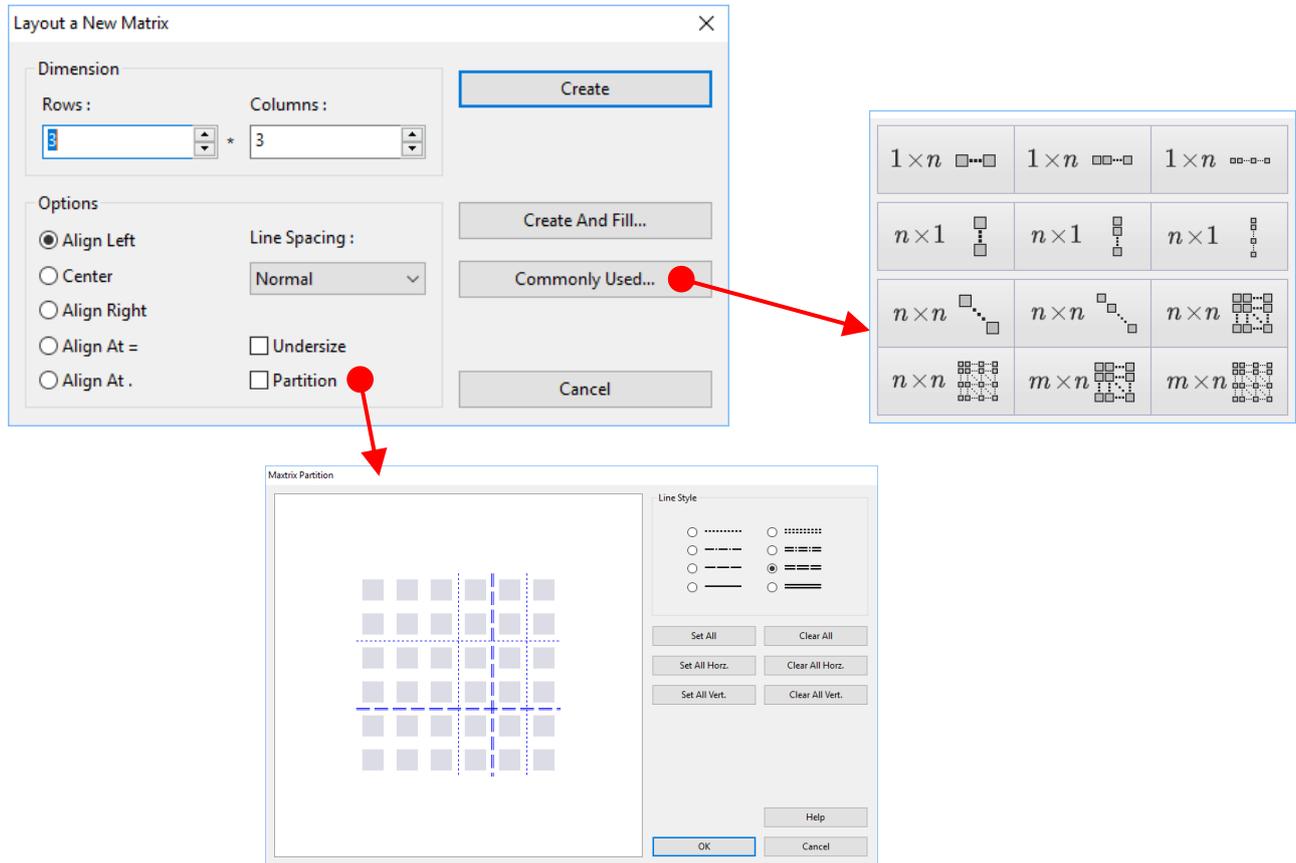
When you click on one of the buttons inside the red-edge rectangle as shown in Fig.3.5.A, the dialog for laying out matrices is opened. Here you can decide the matrix’s dimension, make partition and set typeset options. AxMath also provides a matrix template picker and an auto-fill tool to facilitate the subsequent work after the creation, since a matrix usually has a series of repetitive elements with incremental subscripts.

If you want to create a blank matrix of fixed dimension without opening the matrix building dialog, click on one of the buttons above the red-edge rectangle, as shown in Fig.3.5.A.

Eight special-typset matrix templates are provided on the right side of the matrix palette. They are usually used in an expression of piecewise function, or an expression that is too long to be aligned in one line. Some of them is mentioned in the tutorial chapter.



A



B

Fig.3.5 Tools for Matrix Creation

3.10.2 Modify a Matrix

You should select the matrix before modifying it. Then right-click inside the workspace to pop up the context menu, and you will find a series of submenus, that can be used to modify the matrix's typeset, follows the entry "**Modify the Matrix's Typeset**", as shown in Fig.3.6.

When you right-click on an element of a matrix as you wish, the submenus of "**Change the Matrix's Dimension**" will pop up. You can also using hotkeys (see section 3.3.2 for more details) to change the dimension when the caret is inside the matrix.

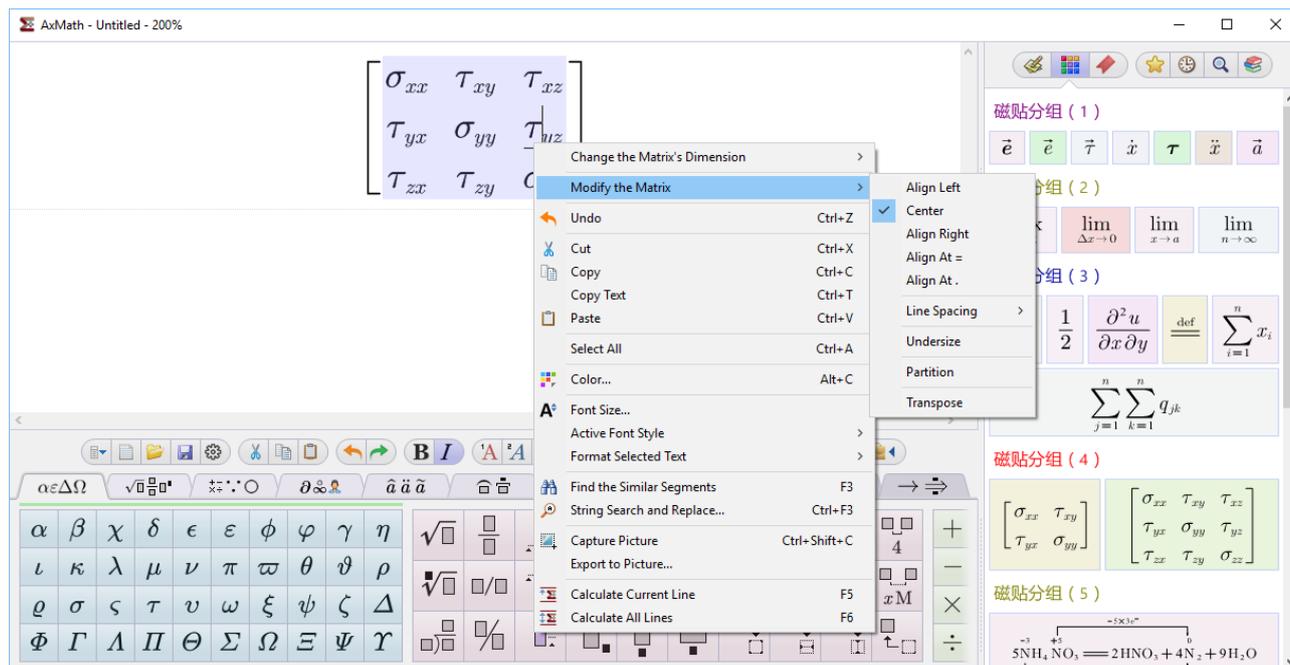
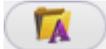


Fig.3.6 Modify a Matrix's Typeset

3.11 User-defined Symbols

You can click on the button () of the palette (), or press the hotkey F4, to open the user-defined symbol panel. Then click on the button "New..." to open the symbol editor and create a new user-defined symbol.

User-defined symbols are built on existing glyphs. So the first thing to create a new symbol is importing a glyph from the font library. Press the button () to do that.

In the symbol editor, you can do minor modifications, such as clipping, scaling, tilting, flipping and so on, while major modifications such as moving knots of the graphic path are not allowed. So selecting a proper font is the most important thing to create the symbol you wished.

Note: The user-defined symbols are saved as a file in the "AppData" folder of the Windows system partition. The file may be lost when you update or reinstall the OS, you should backup the symbols when necessary.

4. Typesetting

4.1 Font and Style

AxMath basically renders equations on the standards of AMS-LaTeX. AMS-LaTeX has involved a well-designed scheme on the font and style, but there are still different requirements on that.

A graphical designer is employed for individual preference of the font and style, as shown in Fig.4.1. It can be opened in the “Font & Style” tab of the “AxMath Settings” dialog, which can be opened by clicking on the toolbar button (). Here you can modify the current scheme by checking buttons, selecting in lists or typing in edit boxes. The meaning of each control is illustrated by the surrounding picture, or text, if necessary.

Note: For the edit boxes representing a size value, positive numbers are required, while for those who representing a position value, all numbers are permitted. The unit for font size number is points (1 point = 1/72 inch), and, a trailing “%” represents a percent of the font size.

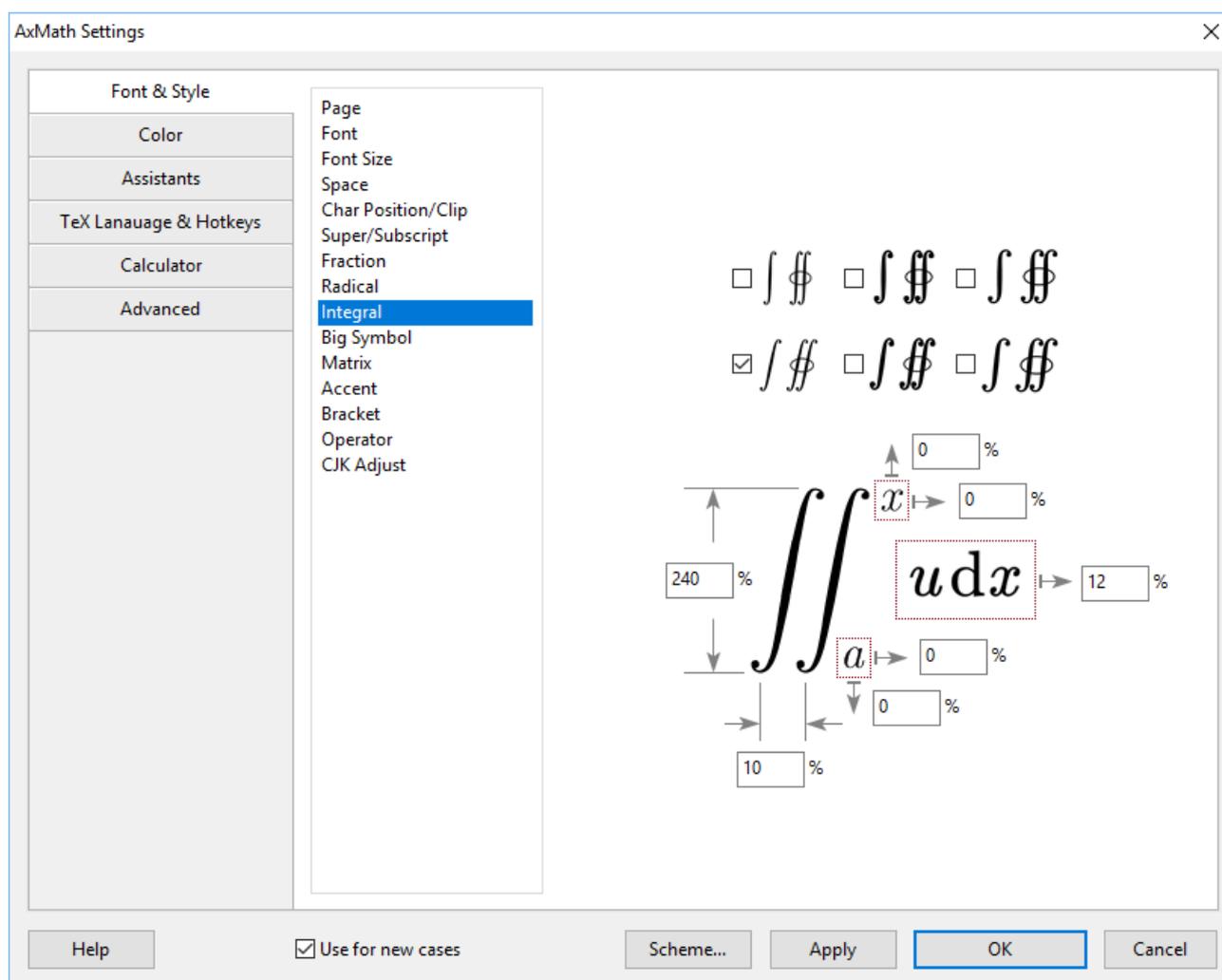


Fig.4.1 The Graphical Designer for Equation Font and Style

4.2 Equation Color

AxMath equations can be automatically colored or manually colored. You can click on the

toolbar button () to toggle.

In the manually coloring mode, you can select a segment of the equation, then click on the toolbar button () to open the color dialog from where you will pick a color for the segment of equation. You can also find the command entry in the context menu from the work space. The hotkey is Alt+C. Another way to color the selected segment is using the hotkey group Alt+1...9. Each hotkey of the group corresponds a color.

In the automatically coloring mode, all symbols and composite structures in the equation are colored automatically according to the color scheme

The hotkey colors and the color scheme for automatically mode can be customized in the "Color" tab of the "AxMath Setting" dialog.

4.3 Scheme

A scheme of AxMath means a group of all settings for font, style and colors which is stored as a file. The AxMath settings dialog presents a button named "Scheme..." at the bottom side, as shown in Fig.4.1. Press on the button to pop up the context menu that allow you to save or reload schemes. There are 3 built-in schemes that are frequently-used and easy find.

1. Default scheme

The group of factory settings. It can not be over-write.

2. The active scheme

A new equation is always formatted by the active scheme. It is copied from default scheme at the first time you start AxMath, and everytime when you change the font, style or colors, the active scheme will be refreshed with the new settings if you have checked on the option "Use for new cases", which can be found at the bottom of the settings dialog.

3. My favorite scheme

This scheme is used for storing your preference settings. You can overwrite it in AxMath using the context menu mentioned above.

The built in themes can also be cited in MS-WORD, please see chapter 6 to learn more information about that.

4.4 Alignment

4.4.1 Alignment with the Surrounding Text

In general, AxMath equation objects that are inserted in an OLE container programs are aligned at bottom with the surrounding text, as shown in the first row of Fig.4.2. But in containers that support baseline alignment, such as MS-WORD and WPS, the equations are aligned at the baseline with their surrounding text by default, as shown in the second row of Fig.4.2. If you want to align an equation at the bottom line with the surrounding text in MS-WORD, select the equation, click the WORD toolbar button "clearing format ()" in the Home tab.

Bottom Alignment	$\dots\text{surrounding text } x_{1, 2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \text{ surrounding text}\dots$
Baseline Alignment	$\dots\text{surrounding text } x_{1, 2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \text{ surrounding text}\dots$ $\iint_D \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} \right) dx dy = \oint_L P dx + Q dy \quad (X.X)$

Fig.4.2 Alignment with the Surrounding Text

You can align a multi-line equation at the whole center or at the baseline of the last line of it with the surrounding text. The check button is located in the “**Advanced**” tab of the “**AxMath Settings**” dialog, which can be opened by clicking on the toolbar button ().

4.4.2 Vertical Alignment

Using the button group (), you can set a multi-line equation to align vertically at left, at center, at right or at the first = (equal sign) of each line. Equal sign alignment can achieve the following typesetting result:

$$y = ax^2 + bx + c$$

$$= a \left(x - \frac{-b + \sqrt{b^2 - 4ac}}{2a} \right) \left(x - \frac{-b - \sqrt{b^2 - 4ac}}{2a} \right)$$

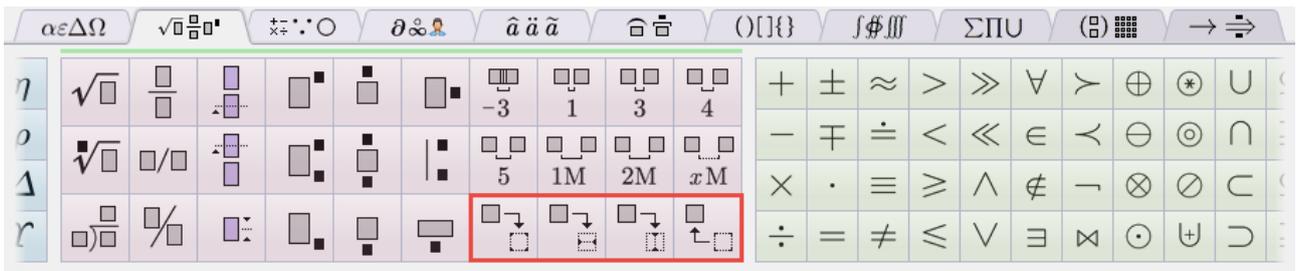
4.4.3 Column Alignment inside a Matrix

Choose either Left, Center, Right, At = (equal sign), or At . (decimal point) to align all the matrix elements in all columns. You can find the options in the laying out dialog when create a new matrix or in the context menu when modifying an exist matrix by right click, as mentioned in section 3.10. A matrix with alignment at decimal point looks like:

$$A = \begin{bmatrix} 1.0 & 1.0 & 0.9 \\ 3.1415926 & 10.0 & 0.99 \\ 2.71828 & 100.0 & 0.999 \end{bmatrix}$$

4.5 Phantom Elements

Phantom techonlogy is occasionally applied for some special purpose. On AxMath’s toolbox panel, there are 4 buttons for phantom, as shown in Fig.4.3.A, inside the red-edge rectangle. The functions of them is illustrated in Fig.4.3.B.



A

Button	LaTeX Code	Function/Effect
	-	Restore the selected phantom elements to original(cancel phantom)
	<code></code>	Create a phantom element with the same width and the same height
	<code>\hphantom{...}</code>	Create a phantom element with the same width and zero height
	<code>\vphantom{...}</code>	Create a phantom element with zero width and the same height

B

Fig.4.3 Phantom Elements

In AxMath’s workspace, the phantom elements are displayed in a specific color (gray by default), as shown in Fig.4.4.A, and are completely hidden when output, as shown in Fig.4.4.B.

$$\begin{array}{ccc}
 \frac{abc}{abc} & \Rightarrow & \frac{abc}{a c} \\
 \text{A} & & \text{B}
 \end{array}$$

Fig.4.4 A Phantom Example

4.6 Spacing

AxMath’s toolbox panel includes a number of buttons to create spacings, as shown in Fig.4.5, inside the red-edge rectangle.

The relative unit **em** is typically used for spaces in equation. One **em** equals to the width of the letter ‘M’. The button () is for creating a space of **1em**, () for $\frac{1}{18}$ **em**, () for $\frac{3}{18}$ **em**, and so on. Negative spacing () is also supported. You can use the button () to create a customizable spacing. You can modify an existing customizable spacing using the context menu, as shown in Fig.4.6.

If you need a lot of spacings to express something in AxMath, you are recommended to turn on the option “show space in editor”, which can be found in the “**Assistants**” tab of the “**AxMath Settings**” dialog.

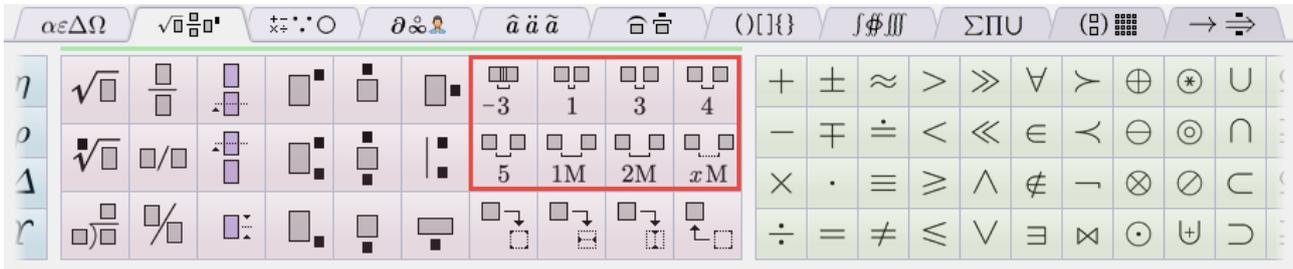


Fig.4.5 Spacing

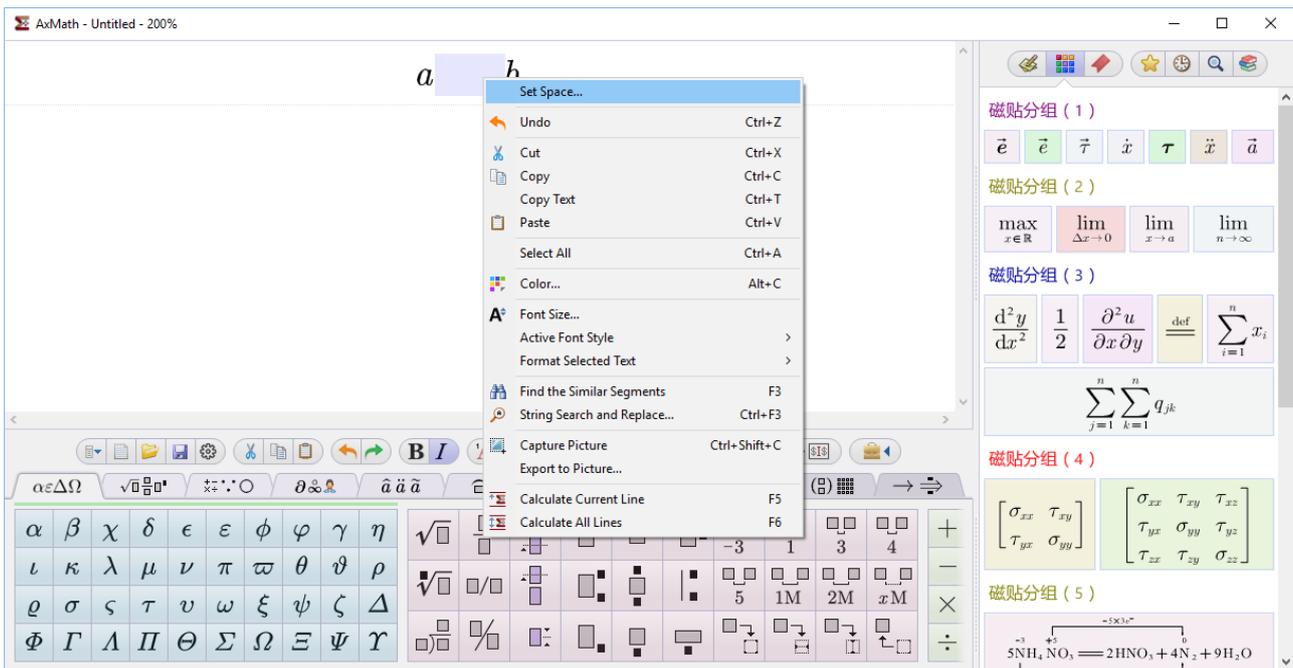


Fig.4.6 Modify a x-Space using the Context menu

4.7 Nesting of Expression-building Structures

Expression-building structures commonly have one or more sub-fields as nests for child elements. You can embed symbols, and other expression-building structures into a expression-building structure. There is no level restriction in such an embedding procedure. It arises as a technology to build special equations. See chapter 9, the tutorial, for more guides about that.

5. Calculator

5.1 How to Work

AxMath's calculator has most of the commonly used scientific calculating capabilities, such as arithmetic, exponential, logarithmic, trigonometric, permutations and so on. The calculator works exactly based on equation. It is a WYSIWYG and intuitive calculator and can be used to replace those desktop key-press-style scientific calculators completely.

When you have typed lines in the workspace like:

$$d = 32$$

$$A = \frac{\pi d^2}{4},$$

press the trigger key (equal sign '=' by default), AxMath will calculate the value of A and fill the result at the end automatically, as shown below:

$$d = 32$$

$$A = \frac{\pi d^2}{4} = 804.24771932$$

The first line, of the above example, defines a variable named d , and with a value of 32. The second line contains the constant π approximately equalling to 3.1415926 as known. The calculation result is the area of a circle with a diameter of 32, and it can be cited as another variable, represented by the A , in the following lines if you will.

You can save such a procedure to a file, and re-open it when necessary, then change the value of the variables and run it all again by using the entry "**Calculate All Lines**" of the context menu, or the hotkey F6. If you have some calculation tasks that are repetitively used and with long procedure, AxMath will save you a lot of time.

You can disable the calculation by the check button in the "**Calculator**" tab of the "**AxMath Settings**" dialog if you do not need it.

5.2 Constants

You can define constants in the "**Calculator**" tab of the "**AxMath Settings**" dialog. A legal constant must be a string started with a character and can not has sub/sup script or accents.

5.3 Variables

Unlike the constants, A legal variable of AxMath must be one character and can has sub/sup script or accents. For examples:

$$x = 0.1, \hat{\xi} = 0.3, B = 0.4, \alpha_1 = \pi, P_{AxMath} = 10$$

The variables are defined in the workspace. You can type more than one variable definition in one line and separate them from each other using commas.

5.4 Units

AxMath's calculator knows no idea about physical units. The user must have the system of units in his mind when do a calculation using AxMath.

When you define a variable of angle, the default unit is rad. If you want define a angle using degree/minute/second, type the unit symbols after the numbers, like:

$$\alpha = 30^\circ, \beta = \frac{\pi}{6}, \gamma = 30^\circ 23' 56''$$

$$\alpha - \beta = 0$$

$$\beta - \gamma = -0.00696192$$

Here the variable α has the same value with β .

5.5 Results

Correspondingly, AxMath will display no unit after the calculation results, but you can set the format of the results, i.e., integer or float, rad or degree, normal or percentage, using the context menu. You can also make the results to be background brushed with a special color to distinguish them from normal numbers. The options are in the "Calculator" tab of the "AxMath Settings" dialog.

5.6 Explanations on Ambiguous Expressions

1. AxMath only accept one kind of scientific notation format, i.e. the natural one such as 3×10^8 . The linear format like $3E8$, even commonly being used in other computer softwares, is not recognizable.

2. Variable definitions are prior than constant definitions.

3. A power exponent expression must be built using the superscript structure ().

Expressions built by the dual-script structure () will be recognized as permutation, started with a uppercase P, or combination, started with a uppercase C.

4. A function following by a superscript -1 will be recognized as the inverse function, for example:

$$x = \sin(1.5)$$

$$\sin^{-1}x = 1.50000000$$

$$\arcsin x = 1.50000000$$

5. Any function in a AxMath equation can only accept one argument. If the argument is a defined variable, a defined constant or a string of numbers, the bracket can be omitted. If the argument is a piece of equation that should be parsed primarily, the bracket can not be omitted

to avoid ambiguity. See the following example:

$$\begin{aligned}\alpha &= 45^\circ \\ \sin 45^\circ &= 0.707107 \\ \sin \alpha &= 0.707107 \\ \sin 2 &= 0.909297 \\ \sin 2 \cdot \alpha &= 0.714161 \\ \sin 2\alpha &= 0.714161 \\ \sin(2\alpha) &= 1\end{aligned}$$

6. By default, “ln” calculates the natural logarithm while “lg” calculates the logarithm based on 10; “log” also calculates the logarithm based on 10 if it is not followed by a subscript field otherwise the logarithm base on the value of the subscript field. For examples:

$$\begin{aligned}\ln e &= 1 \\ \lg 100 &= 2 \\ \log 100 &= 2 \\ \log_2 32 &= 5\end{aligned}$$

6. Using AxMath with Applications and Websites

6.1 Output Pictures

The sub-menus for picture export are provided both in the main menu () and the context menu. The supported formats include:

1. Windows Bitmap (*.bmp)|*.bmp|
2. Joint Photographic Experts Group (*.jpg)|*.jpg|
3. Graphics Interchange Format (*.gif)|*.gif|
4. Portable Network Graphic Format (*.png)|*.png|
5. Tagged Image File Format (*.tiff)|*.tiff|
6. Windows Enhanced Metafile (*.emf)|*.emf|

Another way to get the picture of the equation in the workspace is using the clipboard. Right-click anywhere in the workspace and press “Capture Picture” in the context menu, then the clipboard will be set with the picture data. Metafile and bitmap are both available in that way, you can set the option in the “**Advanced**” tab of the “**AxMath Settings**” dialog.

6.2 Working with LaTeX

Please refer to section 3.5 and section 3.7 for detailed information about how to work with LaTeX.

6.3 Working with Insert Object

Object Linking and Embedding (OLE) is a technology that enables an application to create compound documents that contain information from a number of different sources. It is supported by many applications in Windows OS. They are called OLE containers in this sense and most of them have an insert object command entry in their “**Insert**” menu or somewhere else. The command opens a dialog containing a list of all types of objects that can be inserted. Then choose the item named “**Equation.AxMath**” and AxMath will open a new server instance. Edit your equation and close the window when you are done, the new equation will appear in the container’s document. Any time you want to edit the equation, just double-click it, or right-click on it to find the “Edit” or “Open” command in the context menu.

You can also insert an AxMath object to an OLE container by using the Windows clipboard, as mentioned in section 3.7.

The core of an AxMath object that existing in an OLE container’s document is a Windows metafile image. It is a type of vector image rather than a bitmap one. So you need not worry about the display quality in the final medium, printed sheets or a pdf file, although the objects are not displayed well on the screen in some cases.

6.4 Add-in for Microsoft Word

AxMath installer adds a couple of buttons, as shown in Fig.6.1, to Microsoft Word’s Ribbon (need Word 2010 or later) to help editing documents containing equations.

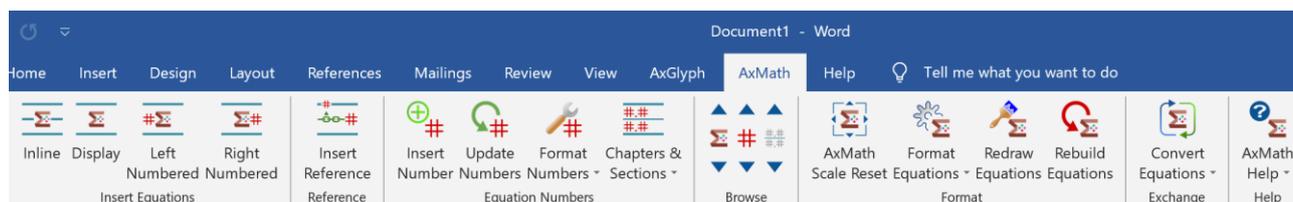


Fig. 6.1 The AxMath Add-in Category on MS WORD Ribbon

6.4.1 Inserting AxMath Equations

You can insert AxMath equations into Word documents by the clipboard or by the insert object menu, as described in previous sections. Yet you are recommended to use the add-in buttons to insert equations because they work properly with the set equation preferences commands that help ensure consistency between the equations in your documents. The AxMath's add-in provides 5 commands for inserting AxMath equations.

1. Inserting an inline equation

This command inserts an AxMath equation to the Word document at the caret point. The equation is aligned with the surrounding text at the baseline. It is used to insert an equation in a sentence.

2. Inserting a display equation

This command inserts a new line firstly if the caret is not already at a new line, and then insert an AxMath equation at the center of the line.

A Word style named **AMDisplayEquation** is defined to the Word document at the first time you add a display equation. This style inserts a center tab and a right tab in the line side with the equation and make the equation being centered by properly positioning the tabs. You can modify the style by “**Format Numbers**” – “**Modify the Looking Style of Equation Numbers**” from the add-in menus.

3. Inserting a left-numbered display equation

This command inserts a display equation firstly, as described in the previous paragraph. And then inserts a left-justified equation number at the line head.

4. Inserting a right-numbered display equation

This command works quite similar to inserting a left-numbered equation but the equation number is right-justified and at the line tail.

5. Toggle AxMath/TeX

The Toggle AxMath/TeX command allows you to type/paste LaTeX code directly into a Word document and convert it into an AxMath equation, or conversely, return an AxMath equation to LaTeX. To distinguish from normal text, you should envelop the LaTeX code using LaTeX math equation delimiters. Using either the $\$...\$$ or $\{(...)\}$ delimiters results in an inline equation after the command, and using either the $\$\$...$$$ or $\{[...]\}$ delimiters results in a display equation after the command. To use the toggle with a single equation, click the TeX Toggle icon and the equation represented by LaTeX code nearest the caret will be converted to a AxMath equation. To convert the entire document or part of it, select the contents and click the submenu “**From LaTeX to**

AxMath", or "**From AxMath to LaTeX**". They are both below the icon "**Convert Equations**" of the AxMath add-in menu.

You can also insert an AxMath equation to a Microsoft Word document using hotkeys, as the following list:

1. Inserting an inline equation(Ctrl+Shift+Q)
2. Inserting a display equation(Alt+Q)
3. Inserting a left-numbered display equation(Ctrl+Shift+Alt+Q)
4. Inserting a right-numbered display equation(Shift+Alt+Q)
5. TeX Toggle with a single equation(Alt+\)
6. Open the equation object near the cursor(Alt+Enter)

6.4.2 Numbering Equations

The numbering commands allow you to insert equation numbers and references to the numbers in a Word document in a variety of formats. Both numbers and references are automatically updated whenever you add new equation numbers to the document or delete equation numbers from it.

Equation numbers are independent from the equations in a Word document. The equation number is not automatically deleted when you delete an equation. Similarly, an equation reference is actually a reference to an equation number, rather than a reference to the equation itself.

The format of equation numbers in a document is defined using the **Format Equation Number** dialog. An equation number is generally comprised of a chapter number, a section number, an equation number, a delimiter and one or more separators, as shown in Fig.6.2. The chapter number, section number, separator and delimiter are all optional, you can create either fully defined equation numbers such as (1.1.1), [1.1.A], or simplified ones such as (1.1), 1.1, or even just 1 or a.

When you edit a document, the sequence of some equation numbers or references may be changed. You can use the **Update Numbers** command in the AxMath add-in menu to update them to the sequence. If you select a region of your document, only this region will be updated, which can be useful with very large documents where entirely updating may take a relatively long time.

When you insert a number to an existing display equation, you should add a tab between the number and the equation to make the number properly aligned to the page boundary.

You can read [E-12](#) in chapter-9 of this document to learn how to create a reference to an equation number in a WORD document.

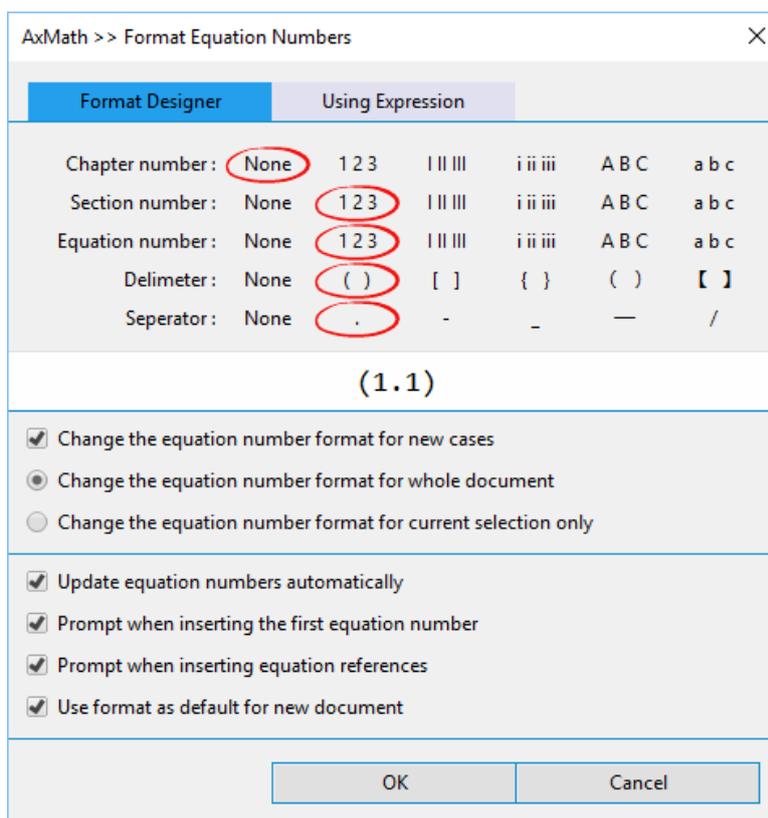


Fig. 6.2 The Format Equation Numbers Dialog

6.4.3 Chapter/Section Breaks

If you are using the chapter numbers, you must insert a chapter break before the first number to define the chapter values. A break can have an explicit value or be set to increment by one the value of the preceding equation chapter. This is also compliant to the section numbers.

Please note that the correct position for chapter/section breaks is the scratch point of the first normal paragraph of the chapter/section. Do not place them around a heading title because the heading titles are usually related to the catalog of a Word document. Chapter/section breaks are built on field code, you can use the command “**Show all breaks**” to find them or edit them if necessary, and use “**Hide all breaks**” to hide them. All of the commands related to chapter/section breaks are below the icon “**Chapters & Sections**” of the AxMath add-in menu.

Note: The chapters and sections referred to here are relative concepts. If you only use 2-level number format, the effect of using sections instead of chapters is the same. The chapter/section breaks inserted in the AxGlyph addin menu is independent of the structure of the WORD document body, and it works for the illustration number only. Also, don't put the chapter/section breaks in the title, which will cause the document directory to be confusing and should be placed somewhere in the body before the first illustration number.

6.4.4 Browsing Objects Created by AxMath

The AxMath browse commands allow you to search for equations, equation numbers and chapter/section breaks through a Word document.

The chapter/section breaks are normally invisible. When browsing chapter/section breaks, the current chapter/section break will be visible in red. You can hide it using the method described in

the previous section.

6.4.5 Format Equations

When you insert a number of equations to a Word document, you typically want all of the equations to use the same font, style and colors so they look consistent throughout the whole document. Using AxMath scheme (see section 4.3) is a good way for that purpose. The add-in tab on Word Ribbon provides several commands to help format equations in Word documents.

1. Scale Reset

Due to the user's incorrect operation or some unknown reason. OLE pictures including AxMath equations may be strained or compressed unexpected in a Word document. This command is used to reset the aspect ratio of AxMath equations.

2. Font Size

Change the font size of all equations or equations in the currently select range.

3. Using My Scheme

Format all equations or equations in the currently select range using my favorite scheme. Please see section 4.3 for more details about scheme.

4. Using Default Scheme

Format all equations or equations in the currently select range using default scheme. Please see section 4.3 for more details about scheme.

5. Toggle AutoColor

AxMath equations can be automatically colored or manually colored (see section 4.2). You can use this command to toggle autocolor for all equations or equations in the currently select range.

6. Detailed

Format all equations or equations in the currently select range using the "**AxMath Settings**" dialog.

7. Redraw Equations

Re-render all equations or equations in the currently select range.

6.4.6 Converting Equations

The Convert Equations commands allow you to convert equations in a Word document from or to LaTeX code. The typical usage of these commands has been described in section 6.4.1.

6.4.7 Auto Font Size

Auto Font Size is not a command from the add-in. It is a option that allow AxMath to detect the font size of the surrounding text where you will insert a equation and make the new equation has the same font size with the surround text. You can find the option in "**Advanced**" page of the "**AxMath settings**" dialog.

7. Register & Upgrade

The shared version of the software provides all core functions and basic editing tools. You can use it free of charge without time limit but its functionality is limited in some way. The licensed version is a better solution if you want to work efficiently with equations. The following list shows the functions that are only available in the licensed version.

1. Cut, Copy, Paste
2. Drag-Drop
3. Gadgets on the Right Sidebar
4. Find and Replace
5. Recalculate All Lines
6. Constants for Calculation
7. Exporting Pictures with PNG, JPG, GIF, TIFF and EMF format.

To use a licensed copy of AxMath on a specific computer, you must firstly activate your copy on the machine using a key. The key will be binded to the computer and can be used once again to activate the same computer but can not be used to activate another computer.

We do not provide online incremental upgrading, but you will be notified if there are new releases. You need to download the latest installation package and do a reinstallation to upgrade the software. Please visit our website www.axsoft.co for detailed upgrade information.

8. FAQ

Q-01. Why does the antivirus software alarm when installing AxMath

The first version of AxMath was released at the end of 2014, and the antivirus software may be sensitive to a new software. The installation package downloaded from our official website (<http://www.axsoft.co>) is guaranteed being safe. To ensure security, you can use antivirus software to scan the installation package before installing.

The installation and running of AxMath requires to read and write the system's registry, if the antivirus software alarm for that reason, please select "allow all operations" or a option like that.

Q-02. Equations appear as { **EMBED Equation.AxMath** } in a Word document

This is related to a display setting of the MS Word. To display equations normally, do the following steps:

1. Click the "File" tab, click "Options".
2. Select the "Advanced" catalog page in the navigation pane on the left.
3. Find the option "Show field codes instead of their value" in the "Show document content" group and turn it off.

You can also use the hotkey Alt + F9 to do the operation directly.

Q-03. Equations appear as empty or shaded boxes in a Word document

The "empty boxes" is a feature of MS Word called "Show picture placeholders" designed to save memory of the computer. This option helps minimize the amount of computer resources required to display a page and helps Word scroll multiple pages faster on-screen. Double-clicking these boxes will launch AxMath and display the equation, and the equations will print correctly. You can turn off the option so that the equations in your document display on the computer screen normally, as the following steps:

1. Click the "File" tab, click "Options".
2. Select the "Advanced" catalog page in the navigation pane on the left.
3. Find the option "Show picture placeholders" in the "Show document content" group and turn it off.

The "shaded boxes" is another feature of MS Word called "Field shading" designed to make it easier to find OLE objects, such as AxMath equations. Please do the following steps to turn it off:

1. Click the "File" tab, click "Options".
2. Select the "Advanced" catalog page in the navigation pane on the left.
3. Find the combo list that labeled "Filed shading" in the "Show document content" group and select either "Never" or "When selected" in the list.

Q-04. AxMath has been installed, but the add-in tab is not found or does not work

The first possible reason is that the Office's version is too old. AxMath's add-in is only for

Office 2010 and later.

The second possible reason is that when you install AxMath, there are some running Word processes in the system, in which case an write failure error will be prompted during the installation. To solve this problem, you should re-install AxMath and make sure that all Word processes have been quit before the re-installation.

The third case is that when you insert a new equation using the addin command, An error message with code 4198 pops up, or a message box pops up prompting: **“The program used to create this object is Equation. That program is either not installed on your computer or it is not responding. To edit this object, install Equation or ensure that any dialog boxes in Equation are closed.”** Please try the following steps to solve this problem:

1. Click the “File” tab, click “Options”.
2. Select the “Add-Ins” catalog page in the navigation pane on the left.
3. At the bottom of the page, find a combo list at the rightside of the label “Manage” and select “Disabled Items” in the list, then click on the button “Go” to open the “Disabled Items” dialog.
4. Select “AxMath.dotm” in this dialog and click the button “Enable”.

Try the following steps if the problem is still exist:

1. Click the “File” tab, click “Options”.
2. Select the “Add-Ins” catalog page in the navigation pane on the left.
3. At the bottom of the page, find a combo list at the rightside of the label “Manage” and select “Templates” in the list, then click on the button “Go” to open the “Templates” dialog.
4. Check “AxMath.dotm” in list.

If AxMath add-in has been enabled but the problem still exists please try the following steps:

1. Click the “File” tab, click “Options”.
2. Select the “Trust Center” catalog page in the navigation pane on the left.
3. Click on the button “Trust Center Settings” to open the “Trust Center” dialog box.
4. Select the “Macro Settings” catalog page.
5. Select “Disable all macros except digitally signed macros” or “Enable all macros”.

In another case this problem is accompanied by a message box prompting: **“VBE6EXT.OLB’ could not be loaded”**. VBE6EXT.OLB is Visual Basic Extensibility. It could be possible that VBE6EXT.OLB which is required to run VBA for Office is corrupted. See if you can repair the installation. If it doesn’t, reinstalling it should fix the problem. A reference solution can be found at <https://social.technet.microsoft.com/Forums/office/en-US/1d3e9aa0-2069-4f7b-b6cf-c47e00d637f5/vbe6extolb-could-not-be-loaded?forum=officeitproprevious>

Q-05. How to remove the AxMath’s add-in temporarily from MS-Word

Open the Word Options dialog, and then click Add-ins. In the Manage combo list, select Templates, and then click Go. Uncheck the box next to the AxMath.dotm item.

Q-06. How to remove the AxMath's add-in permanently from MS-Word

Quit all Word processes and remove the AxMath Commands for Word file from Word's startup folder. You can search the file named "AxMath.dotm" on your computer if you do not know where it is.

Q-07. Why the add-in's dialog box does not respond or contains warning content

AxMath applies HTML dialogs in the WORD addins. The dialogs will not respond if the IE disables active scripting. Please try the following steps to fix the problem:

1. Open IE, find "Tool" in the menu, then click the "Internet Options".
2. Select the "Security" catalog page.
3. Click on the button "Custom Level..." to open the "Security Settings" dialog.
4. Enable "Active Script".

In another case, a warning content is popped up: "To help protect your security Internet Explorer has blocked this website from displaying content with security certificate errors. Click here for options...". This warning appears if the IE's security level is set to the highest level. You should make sure that the IE's security level is medium high or lower. You can search for more suggestions on <https://answers.microsoft.com>.

Q-08. AxMath equations cause line spacing to increase in MS Word

When an AxMath equation is inserted, sometimes it causes the line spacing above and below the equation to increase. This makes the paragraph that contains the equation look less harmonious compared to rest of the document.

The first solution for this problem is setting the paragraph line spacing to "Exactly", and increase the line spacing to a sufficient value to prevent the equations from being clipped off. You are recommended to read **Q-09** of this chapter to learn more about "clipped off" and how to set the paragraph line spacing.

The second solution does not need to set the line spacing to "Exactly", but it is only an approximate solution rather than making all lines equidistant. The solution is implemented by the following steps:

1. Click the "Page Layout" tab from the MS Word's Ribbon.
2. Go to "Page Setup" group and click the "Page Setup" button (the small arrow at the right bottom corner) to open the page setup dialog.
3. Select the tab "Document Grid", select "No Grid" in the "Grid" group.
4. Make sure that the font size of the equations is not larger than the surrounding text.

Q-09. Top and bottom of AxMath equations are clipped off in MS Word

If the paragraph line spacing in MS Word is set to "Exactly" and the line spacing value is not big enough, when you insert AxMath equations into a Word document, the top and bottom of some of the equations may be clipped off.

To solve this problem, you can either select an option other than "Exactly" in the line spacing combo list, or increase the line spacing to a sufficient value if you still want to use "Exactly" line

spacing. You can find all these setting items by the following steps:

1. Click the “Home” tab from the MS Word’s Ribbon.
2. Go to “Paragraph” group and click the “Paragraph” button (the small arrow at the right bottom corner) to open the paragraph setting dialog.
3. Select the tab “Indents and Spacing”, you will find a combo list labeled “Line Spacing” and a edit box labeled “At”, which is for inputing the line spacing value.

You are recommended to read **Q-08** of this chapter to learn how to properly set the line spacing of the paragraphs that contain AxMath equations.

Q-10. AxMath equations appear raised above the baseline in MS Word

In most cases, you just need to redraw or rebuild the equations to solve the raise issue. There are three methods we recommend to redraw:

1. Select the equation and right-click in MS Word to pop up the context menu, then select AxMath Object>>Redraw from the context menu.
2. Double-click the equation to open it in AxMath. Click on the button “Save” () or press the hotkey Ctrl+S to save it. Close AxMath and back to Word.
3. To re-draw all equations in the whole document or in a select range, click on the icon () from AxMath’s addin on MS Word’s Ribbon.

If the redrawing method does not work, try to rebuild the equations by following the steps below:

1. Involve the equations with the raise issue into a selection range
2. Click on the icon () from AxMath’s addin on MS Word’s Ribbon.

There is a very specific case caused by a Microsoft security update. It is a bug of MS Word so Microsoft should fix it. This bug mainly have effect on .docx document of MS Word. So, a method to prevent the problem from occurring is to save your file as a .doc format, rather than .docx.

Until Microsoft gives a reliable solution, you will need to make some adjustment to the “Position” attribute inside the “Character Spacing” properties. Please follow the steps below:

1. Move the caret right after the equation that raised vertically in the line.
2. Select the “Home” tab from the MS-Word’s Ribbon.
3. Go to the “Font” group and click the “Show Font Dialog” button (the small arrow at the right bottom corner) or press the hotkey Ctrl+D to open the font dialog.
4. Select the “Character Spacing” tab in the font dialog.
5. Click the combo list labeled “Position” and select “Normal” from the list.
6. Click OK on the Font dialog.
7. Re-render the equation if necessary.

Q-11. Equations in a Word document are deformed

When you re-open a Word document that contains AxMath euqations, you may find some of

the equations have been deformed, i.e. stretched or squashed. This bug has existed for a long time in MS-Word.

Until Microsoft solves it completely, you can use the command “AxMath Scale Reset” () on the add-in to restore all AxMath equations to their original scale. Please see section 6.4.5 for more information.

Q-12. How to change the style (font) of equation numbers

In MS Word, the equation numbers are styled with a style named **AMDisplayEquation** (see section 6.4.1). You can modify the style by “**Format Numbers**” – “**Modify the Looking Style of Equation Numbers**” from the add-in menus.

Q-13. Equations and equation numbers are out of position

This problem usually occurs after page layout or page margins are adjusted. You sometimes notice after such a adjustment, the display equations are no longer centered properly, or the equation numbers are no longer closely aligned at the right page boundary.

In MS Word, AxMath equations and the numbers are both positioned with a style named **AMDisplayEquation** (see section 6.4.1). Therefore, making any change that affects margin settings may cause this problem. The **AMDisplayEquation** style was inserted at the first time you added a display equation. It is not listed in the Style Gallery of MS Word by default. Please read **Q-12** of this chapter to learn how to find the style and modify it.

You can also do an autocorrect using the command “Update Numbers” () from AxMath’s addin on MS Word’s Ribbon.

Q-14. In some applications the equations shows blurring

This is because AxMath has compatibility issues with the application. You can try to solve the problem by updating the software to the latest version.

Q-15. Can not select a specific segment while editing a equation using the mouse

You can press down the left button of your mouse and move the mouse cursor from one point to another, to select a specific segment from the workspace. That is a very commonly used operation in most of text editor.

In most cases when editing a equation in AxMath, you can precisely select what you want to select by controlling the start point (where you press down the left button) and the end point (where you release the left button). But for expression-building structures that have one or more child fields, sometimes it is difficult to do such a selection because the parent’s boundary coincides with, or is very close to, one of its children. In these cases, you can use the keyboard to make the selection. For example, if you want to select the numerator from a fraction, rather than the whole fraction, you can follow the steps below:

1. Move the caret to the head of the numerator.
2. Press the Ctrl key down and hold it before you finish the selection.
3. Knock the right arrow key for some times until the numerator is completely selected.

Q-16. The icons on AxMath's UI are too small to identify

This issue is serious on those computers with a high resolution screen. The solution is:

1. Right click on the toolbox panel, select "Appearance..." from the context menu to open the appearance settings dialog.
2. Select "Large" or "Auto" from the combo list titled "Toolbar Size".
3. Restart AxMath.

Q-17. The chapter/section breaks leads to a disordered catalog

This issue arises if one or more chapter/section breaks has been placed together with the chapter/section title. The chapter/section breaks should be placed at the head of the body text rather than the title.

Q-18. The "Insert AxMath Equation" on PowerPoint's Ribbon does not work

This issue arises if the template file name "AMObj.afx", which is located in a subfolder named "User" from AxMath's installation path, was setted with a "Read only" file attribute. Remove that attribute from the file to fix this problem.

Q-19. Some menus, buttons or controls of AxMath do not work in Win10

If you have upgraded your OS from Win7 or Win8 to Win10, there is a possibility of such a problem. Win10 is far away from a stable system.

You can try reinstalling AxMath to solve the problem. If it is still exist after that, follow the steps below:

1. Right-click on the icon of AxMath and select Properties in the context menu. You can do this from the AxMath's shortcut or by navigating in File Browser to the exe file.
2. Select the Compatibility tab, then check the box next to "Run this program in compatibility mode for".
3. Select the version of Windows to use for your app's settings in the dropdown box, Win7 or Win 8.
4. Hit Apply, then run your AxMath and see if this fixed your issues.

Q-20. Euqations have become non-editable "picutures" in MS-WORD

When opening a previously saved MS-WORD document containing AxMath objects, you may find that all or some of AxMath objects have become no longer editable. This issue is associated with the Auto-recovery function in MS-WORD, i.e. it is a bug of MS-WORD. The same issue happens with not only AxMath, but also any kind of OLE object, including MS-EXCEL charts.

Microsoft recommends turning off the Auto-save function, especially when editing a large volume document. Unfortunetly, Microsoft has not provided any way to repair those OLE objects that have already become non-editable.

Follow the steps below to disable the Auto-save fucntion in MS-WORD:

1. Click the "File" tab, click "Options".

2. Select the “Save” catalog page in the navigation pane on the left.
3. Remove the check mark from "Save Auto-recovery data every x minutes.”

9. Tutorials

In this chapter, A series of tutorials are presented to help you become more skillful at equation editing using AxMath. We have tried to cover as many subjects as possible in the tutorials, also contains some relatively uncommon or more complex equation examples.

If you have no experience in using AxMath, we recommend you read and exercise all tutorials step by step from the very scratch. Some steps may only have a simplified description if a similar step has been described in detail in a previous example.

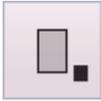
The following step-by-step instructions for each example are based on the symbol panel of AxMath. When you are familiar with the use of this software, we recommend you use the hotkeys and the interactive LaTeX as far as possible to improve the working efficiency.

Since AxMath is not a linear editor, you will need to move the caret from one field to another frequently. In most cases, you can move the caret to the desired field using the four arrow keys according to the relative position.

E-01. A Basic Tutorial of Fraction, Sub/Sup Script and Square Root

In this tutorial we will create the equation

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

1. In the AxMath workspace, type x .
2. Click on the icon () from the palette (), or press the hotkey Ctrl+L, to create a subscript after the x , then type $1, 2$ in the subscript field.
3. Press the right arrow key to move the caret out of the subscript field and type $=$.
4. Click on the icon () from the palette (), or press the hotkey Ctrl+F, to create a fraction after the $=$.
5. Type $-b$ in the numerator field of the fraction.
6. Click on the icon () from the palette () to create a \pm after the $-b$.
7. Click on the icon () from the palette (), or press the hotkey Ctrl+R, to create a square root after the \pm .
8. Type b inside the radical. Click on the icon () from the palette (), or press the hotkey Ctrl+H, to create a superscript field after the b . Type 2 in the superscript field and press the right arrow key to move the caret out of the superscript field. Make sure

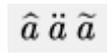
that the caret is still inside the radical, then type $-4ac$.

9. Press the down arrow key to move the caret into the denominator field of the fraction. Then type $2a$, you can also move the caret by mouse clicking on the denominator position.

E-02. A Basic Tutorial of Greek Characters, Sum, Bracket and Accent

In this tutorial we will create the equation

$$\sigma^2 = \frac{1}{N} \sum_{i=1}^N (x_i - \bar{x})^2$$

1. In the AxMath workspace, click on the icon () from the palette (), or press the hotkey Ctrl+G and type "s", to create a Greek character σ .
2. Click on the icon () on the palette (), or press the hotkey Ctrl+H, to create a subscript after the σ , then type 2 in the subscript field.
3. Press the right arrow key to move the caret out of the subscript field and type $=$.
4. Click on the icon () on the palette (), or press the hotkey Ctrl+F, to create a fraction after the $=$. Then type 1 in the numerator field and N in the denominator field respectively.
5. Move the caret out of the fraction by pressing the right arrow key. Then click on the icon () on the palette () to create a sum with three sub-fields.
6. Type N in the top sub-field of the sum and $i=1$ in the bottom sub-field.
7. Press the right arrow key to move the caret into the right sub-field of the sum. Click on the icon () on the palette (), or press Shift+9, to create a bracket.
8. Create $x_i - x$ into the bracket. Make sure the caret is at the right side of the second x then click on the icon () on the palette (), this operation will change the second x into \bar{x} .
9. Press the right arrow key to move the caret out of the bracket. Click on the icon () on the palette (), or press the hotkey Ctrl+H, to create a superscript after the bracket. Type 2 in the superscript field.

E-03. A Basic Tutorial of Multi-line Equation

In this tutorial we will create the equation

$$y = ax^2 + bx + c$$

$$= a \left(x - \frac{-b + \sqrt{b^2 - 4ac}}{2a} \right) \left(x - \frac{-b - \sqrt{b^2 - 4ac}}{2a} \right)$$

There are two methods to create this equation. If you need to convert the equation to LaTeX code, then use the first method, otherwise, the second one is recommended.

Method-1:

1. In the AxMath workspace, type y .
2. Click on the icon () from the palette () to create a left aligned array with 2 elements.
3. Move the caret into the top element and create $= ax^2 + bx + c$.
4. Then create $= a \left(x - \frac{-b + \sqrt{b^2 - 4ac}}{2a} \right) \left(x - \frac{-b - \sqrt{b^2 - 4ac}}{2a} \right)$ into the bottom one.

Method-2:

1. In the AxMath workspace, type $y = ax^2 + bx + c$.
2. Press Enter key to create a new line.
3. Then create $= a \left(x - \frac{-b + \sqrt{b^2 - 4ac}}{2a} \right) \left(x - \frac{-b - \sqrt{b^2 - 4ac}}{2a} \right)$ into the second line.
4. Make sure the alignment is set to "Align at '='" () before saving and exiting.

E-04. A Basic Tutorial of Piecewise Function

In this tutorial we will create the equation

$$|x| = \begin{cases} -x & \text{if } x < 0 \\ x & \text{if } x \geq 0 \end{cases}$$

1. In the AxMath workspace, click the icon () from the palette () to a couple of absolute delimiters, the type x into the sub field.
1. Move the caret to the end of the line and type $=$.
2. Click on the icon () from the palette () to create a piecewise function template, which provides 4 sub fields.
3. Fill the sub fields of the template respectively.
4. You can press the Enter key at the end of the last sub field to create a new row if you need one more domain.

E-05. Modify Matrix Elements in Batch by Finding and Replacing

In this tutorial we'll modify the matrix from $\begin{pmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{pmatrix}$ to $\begin{pmatrix} \vec{e}_{11} & \vec{e}_{12} & \vec{e}_{13} & \vec{e}_{14} \\ \vec{e}_{21} & \vec{e}_{22} & \vec{e}_{23} & \vec{e}_{24} \\ \vec{e}_{31} & \vec{e}_{32} & \vec{e}_{33} & \vec{e}_{34} \\ \vec{e}_{41} & \vec{e}_{42} & \vec{e}_{43} & \vec{e}_{44} \end{pmatrix}$.

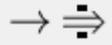
Obviously, deleting and typing one by one is a effective but low efficiency approach. For this case, you can using finding and replacing to modify the matrix more efficiently.

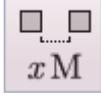
1. Select any a a from the matrix.
2. Right click in the workspace, and click the command "Find the Similar Segments" in the context menu, or press the hotkey F3. Then you will find all of a are background brushed with light-green color.
3. Move the caret to the tail and create a template \vec{e} , then select it.
4. Right click in the workspace, and click the command "Replace All Find Results With The Selected" int the context menu.
5. Delete the template \vec{e} .

E-06. An Advanced Tutorial of Matrix Nesting, Spacing and Arrows

In this tutorial we will create the equation

$$\begin{array}{ccccccc}
 & & & & 0 & & \\
 & & & & \downarrow & & \\
 0 & \rightarrow & \mathcal{O}_B & \xrightarrow{\iota} & \mathcal{E} & \xrightarrow{\rho} & \mathcal{L} \rightarrow 0 \\
 & & \parallel & & \downarrow \phi & & \downarrow \varphi \\
 0 & \rightarrow & \mathcal{O}_C & \rightarrow & \pi_* \mathcal{O}_D & \xrightarrow{\delta} & R^1 f_* \mathcal{O}_V - D \rightarrow 0 \\
 & & & & & & \downarrow \\
 & & & & & & R^1 f_* \mathcal{O}_V - iM \otimes \gamma^{-1} \\
 & & & & & & \downarrow \\
 & & & & & & 0
 \end{array}$$

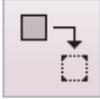
1. In the AxMath workspace, click on the icon () from the palette () to open the matrix layout dialog. Set rows to 9 and close the dialog.
2. Move the caret to the first element and type 0.
3. Move the caret to the second element, then click on the icon () on the palette () to create a down arrow into the sub-field.
4. Move to the third element, and fill $0 \rightarrow \mathcal{O}_B \xrightarrow{\iota} \mathcal{E} \xrightarrow{\rho} \mathcal{L} \rightarrow 0$ into the sub-field. The characters with mathcal font style can be found on the palette () and the arrows with a top sub field can be found on the palette().

5. Fill the remaining rows similarly. You need click on the icon () on the palette () after the down arrow to create $\downarrow \phi$.
6. Move the caret to the head of the first row. Click on the icon () on the palette () to create a customizable spacing and give it a proper width. Please see section 4.6 to learn more about spacing and how to adjust the width of a customizable spacing.
7. Insert spacings to anywhere you think it is needed, and adjust their width until the equation is correctly expressed and looks coordinated.

E-07. An Advanced Tutorial of Phantom and Negative Spacing

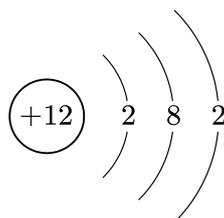
In this tutorial we will create the equation

$$\overbrace{\circ \circ \circ \circ \overbrace{\circ \circ \circ \circ}^{AB}}^A$$

1. In the AxMath workspace, click on the icon () from the palette () to create a overbrace structure with 2 sub-fields.
2. Move the caret to the top sub-field of the overbrace, then type A into the field.
3. Move the caret to the bottom sub-field of the overbrace, then click on the icon () on the palette () for seven times to create seven circles into the sub-field.
4. Select the last three circles in the bottom sub field of the overbrace, then click on the icon () from the palette () to create an child overbrace structure with 2 sub-fields.
5. Move the caret to the top sub-field of the child overbrace, then type AB into the field.
6. Move the caret to the end of the line, then click on the icon () from the palette () to create an underbrace structure with 2 sub-fields.
7. Move the caret to the top sub field of the underbrace structure and create five circles, as described in step 3. Then type B into the bottom sub field.
8. Select the left three circles in the top sub field of the underbrace, then click on the icon () from the palette () to change the selection to be a phantom element.
9. Insert a customizable spacing before the underbrace structure and adjust its width until the equation is correctly expressed and looks coordinated.

E-08. An Advanced Tutorial of Atom Electron Shell Diagram

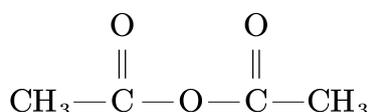
In this tutorial we will create the atom electron shell diagram

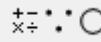


1. In the AxMath workspace, click on the icon () from the palette () to create the nucleus, and type +12 into the center field.
2. Move the caret to the end of the line, click on the icon () from the palette () to create the first electron shell, and type 2 into the field.
3. Repeat step 2 twice to create the second and the third electron shell.

E-09. An Advanced Tutorial of Compound Structure

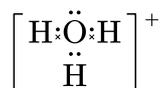
In this tutorial we will create the compound structure

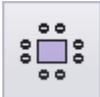


1. Type CH₃ into the AxMath workspace.
2. Click on the icon () from the palette () to create a strikethrough structure as the the first single bond, then insert a "1M" () spacing into the strikethrough structure. The spacing is used to give the bond a proper length.
3. Move the caret to the end of the line, then click on the icon () from the palette () to create a bottom aligned array with 2 sub-fields.
4. Type C into the bottom sub field and create another bottom aligned array () into the top field. Then create the O and the || at proper position. The || can be found on the palette ().
5. Creat the centered O and the right half similarly.

E-10. An Advanced Tutorial of Electronic Formula

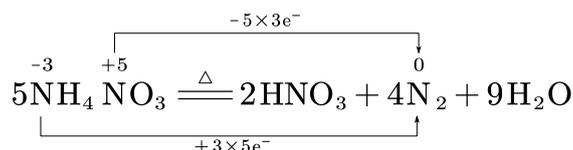
In this tutorial we will create the electronic formula



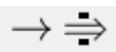
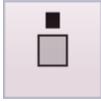
1. Type **H** into the AxMath workspace.
2. Move the caret to the end of the line, then click on the icon () from the palette () to create a top aligned array with 2 sub-fields.
3. Move the caret to the top sub field of the array, then click on the icon () from the palette () to create a electronic formula template and open the electronic formula designer dialog. You can click the positions to switch between solid dots and crosses.
4. Type **O** into the centered sub field of the electronic formula template.
5. Type **H** into the bottom sub field of the array.
6. Move the caret to the end of the line and type the last **H**.
7. Select all and click the icon () from the palette () to create a center alignment structure. Such a operation will move all what you have created in the previous steps to the sub field of the center alignment structure.
8. Select all once again and click the icon () from the palette () to a couple of square brackets.
9. Move the caret out of the brackets, then create the superscript ⁺ at the end of the line.

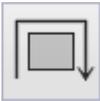
E-11. An Advanced Tutorial of Reaction Equation

In this tutorial we will create the reaction equation



1. In the AxMath workspace, click on the icon () from the palette () to create a over-under structure with 3 sub-fields.
2. Move the caret to the middle sub field of the over-under structure, then create

$5\overset{-3}{\text{N}}\overset{+5}{\text{H}_4}\text{NO}_3 \xrightarrow{\Delta} 2\text{HNO}_3 + 4\overset{0}{\text{N}}_2 + 9\text{H}_2\text{O}$ into the sub-field. Use the icon () from the palette () and the icon () on the palette () to create the long equal sign with a heating symbol $\xrightarrow{\Delta}$. Use the icon () from the palette () to create those atoms with a top label of charge number.

3. Move the caret to the top sub field of the over-under structure, then click on the icon () from the palette () to create a over-script structure with 2 sub-fields.
4. Move the caret to the bottom sub field of the over-script structure, then click on the icon () from the palette () to create a left to right transition symbol.
5. Type $-5 \times 3e^-$ into the top sub field of the over-script structure.
6. Create a customizable spacing before the over-script structure and give it a proper width.
7. Create a customizable spacing into the sub field of the transition symbol and give it a proper width.
8. Fill the bottom sub field of the over-under structure similarly.

E-12. Insert number references in a Word document

1. In MS Word, move the caret to where you want insert the reference.

2. Click on the icon () from AxMath's addin on MS Word's Ribbon, a placeholder

in yellow background (*) will appear.

3. Click the equation number that you want to refer to, the placeholder will be replaced by the number.