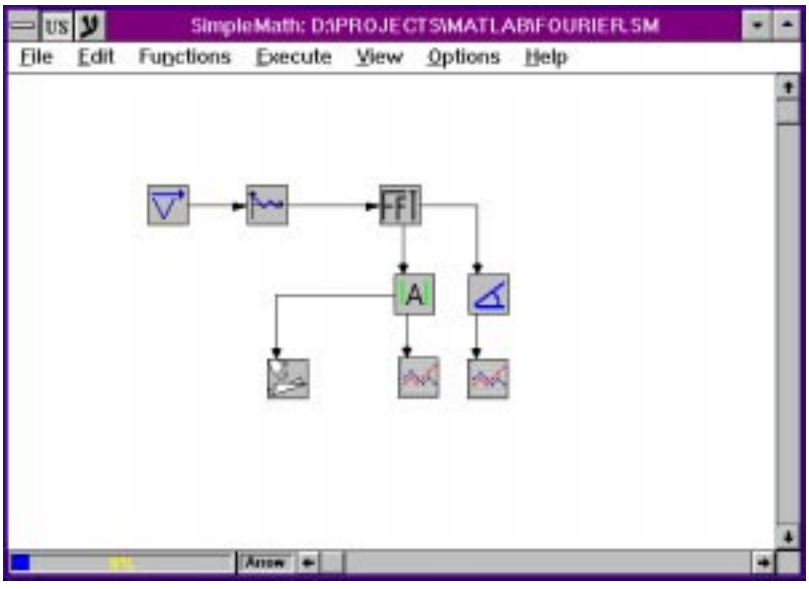
SimpleMath

Introduction

SimpleMath is the easy way to perform complex mathematical calculations, using Matlab© - probably the most widely used mathematics software among engineers and scientists. SimpleMath is a graphics programming interface and interpreter. That is, it interprets the wanted calculation, entered by the user by graphic methods, to Matlab© script.

SimpleMath is especially suited for scientists and students who find the Matlab© text interface awkward, because it requires remembering command options and formats.

In SimpleMath, calculations are entered by "Boxes", each of which performs a function or generates a variable. Boxes are selected from the array of built-in SimpleMath functions (through a toolbox or menu) or from the extensive variety of Matlab© functions. After the needed functions are placed on screen, the user simply connects them by arrows. When the user finishes entering a calculation, the Matlab© script is generated by one simple command. It's as simple as that.



Programming in the SimpleMath method

The basic building block of the software is a “Box”. Each box performs a function or generates a variable. Each box has up to three inputs (depending on the function) and up to five outputs. Choosing the wanted function can be done either from the built in SimpleMath functions (through the toolbox or the menu) or from the extensive variety of Matlab© functions. After selecting the function and entering the needed parameters, it is placed in the working area.
Functions are then connected together by arrows, from the box which provides the data, to the one receiving it.

Afterwards, when the user finishes entering a calculation, he or she selects the ‘Execute’ option from the menu, to interpret the calculation into Matlab© script, either in the clipboard or into a file. The interpreting is done from designated “Starter Boxes” or from any box with no inputs, and goes along the arrows until it reaches the end. The interpreter is made to recognize infinite loops and solve them with the user’s guidance. From the Clipboard it can then be pasted into Matlab© by one stroke of keys (CTRL + V) and executed.

Simplicity of Use

Choosing a Function

As was mentioned, functions are entered as boxes. This can be done from the SimpleMath built-in commands or from the list of Matlab© commands. The later means that you don’t have to update your SimpleMath program every time you acquire a new toolbox, but just to ask the program to rescan your drive so it can know where every file is.

Choosing functions from the built-in functions can be done from the menu or from the toolbox. The toolbox can be organized according to the user’s choice.

The toolbox pictured in figure 1 has functions to accept input from a file, to output data to the screen or to a graph, arithmetic functions such as square root and logarithm, various loops, subroutines (a feature unique to SimpleMath) , general functions and a box to create arrows. Of course, these aren’t the only functions available. You can browse through many more using the two arrows in the upper right corner of the toolbox.

Figure 1

Some functions are grouped so that they are easy to find and choose. For example, if the user chooses the "Matrix Manipulation" from the toolbox, the screen in figure 2 will appear, and prompt her to select one of the functions available for matrix manipulation.

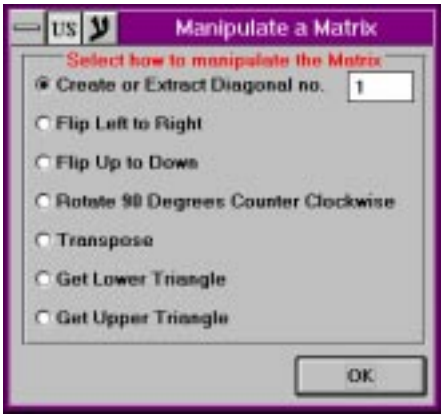


Figure 2

Should you choose to operate a Matlab© function, a special screen will appear, to help you find a function to choose your needs. In this screen you can browse through the functions in your computer, arranged by subject, and see what they are supposed to do. When you find the best function for your needs, just choose it, and place the box on screen. In figure 3 you can see an example of choosing a function from the control toolbox of Matlab©. The example shows the use and format of the function PZMAP.

Figure 3

Entering Parameters

Some functions require parameters to work properly. SimpleMath greatly simplifies entering these parameters. Probably the best demonstration of this is the Plot Function screen, shown in figure 4. Plotting a functions in Matlab© requires more than one command. You need to decide on the type of graph you want to show, plot it, show a grid, and then place titles and legends. In SimpleMath this is done through one screen, and the options available to you are highlighted while others are grayed. This way you can show what you want with the minimum fuss and hassle.

Figure 4

Placing boxes on the screen and connecting them

Once you've chosen a box, you can place it on the work area. This is done by clicking on the point you want in the work area. A box can be moved or deleted. Boxes are connected by arrows, that start from the box which provides the data, and end in the box that needs to process the data. For better visualization, arrow colors can be changed to any of the colors supported by the actual computer system.

Depicted in figure 5 is a sample computation which reads a matrix, transposes it, multiplies it by a vector and shows the result on screen and also saves it to a file.

Notice that when the cursor passes over a box, the box name appears in a small yellow box.

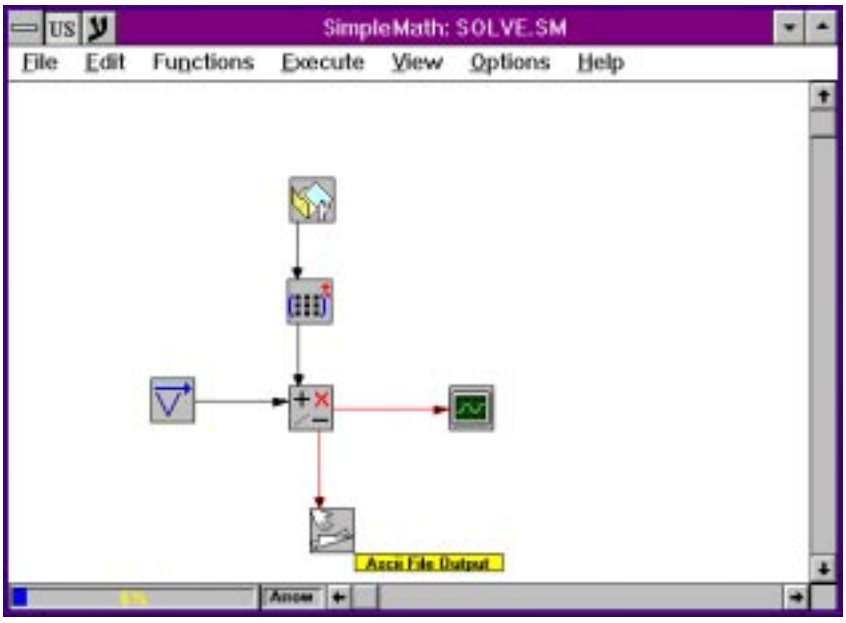


Figure 5

If the user chooses the ‘Execute’ option, the generated commands are:

```
load D:\PROJECTS\MATLAB\INMAT.TXT;
box1=INMAT;
box3=box1';
box2=[0:1:9];
box4=box2*box3;
save D:\PROJECTS\MATLAB\OUTMAT.TXT box4 -ascii;
box5=box4
```