

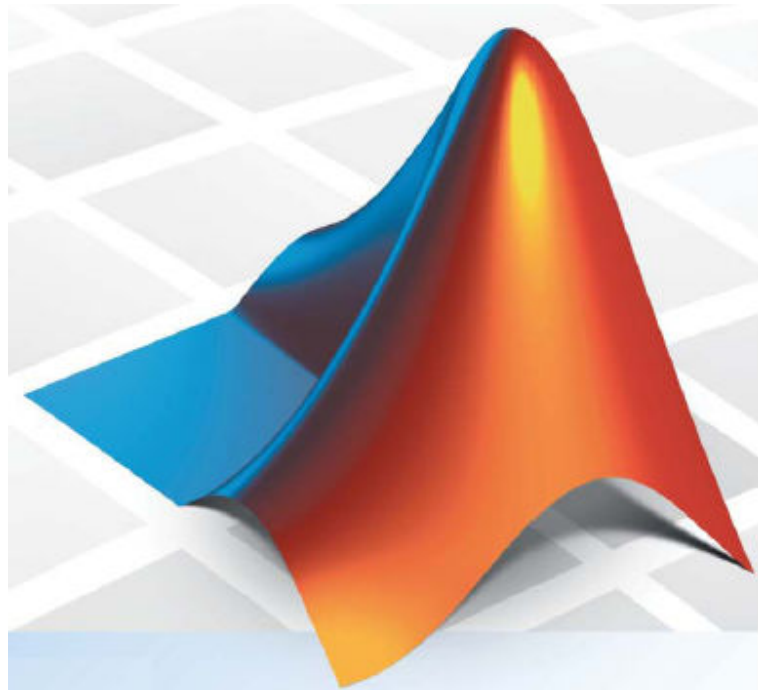
Getting Started to MATLAB

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اللهم علمنا ما ينفعنا و انفعنا بما علمتنا و زدنا علماً

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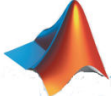
1. Introduction

This chapter will serve as a hands-on tutorial for beginners who are unfamiliar with MATLAB. It is assumed that readers have either the student edition or a full version of MATLAB.

Here we will learn how starting MATLAB, doing simple math. Although this book tries to explain the MATLAB commands as clearly as possible, keep in mind that learning a new language is confusing and tedious in the beginning. Trying the commands and practicing them on the computer will help you to understand them.

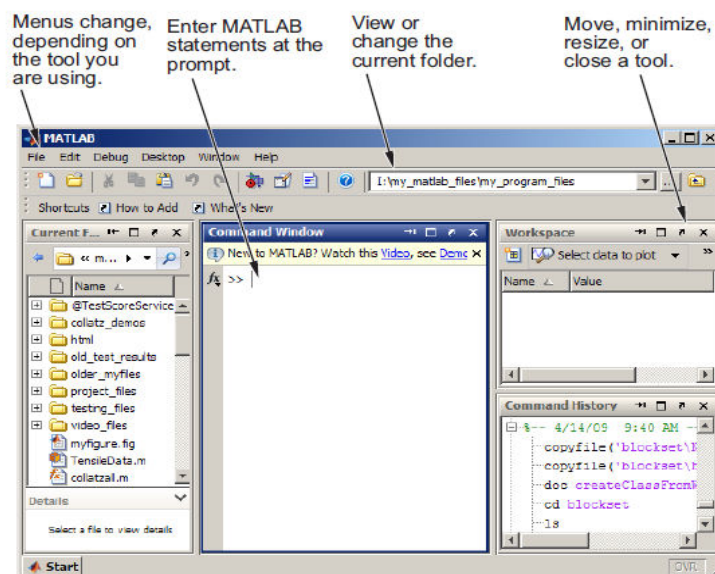
1.1 Starting and Quitting the MATLAB Program

Starting a MATLAB Session

On Microsoft Windows platforms, start the MATLAB program by double-clicking the MATLAB shortcut  on your Windows desktop.

Or Start → Programs → MATLAB → 

The main MATLAB window, called the command window, will then appear and it looks like this:



Once the *command prompt* ">>" appears MATLAB is waiting for you to type a command to execute; let's enter a simple MATLAB command, the date command. Click the mouse where the blinking cursor is and then type date and hit the enter key. MATLAB should then return something like

Quitting the MATLAB Program

To end your MATLAB session, select **File > Exit MATLAB** in the desktop. Or type quit in the Command Window. You can run a script file named finish.m each time MATLAB quits that, for example, executes functions to save the workspace.

1.2 Simple Math

MATLAB can be used just like a pocket calculator. For example, here is how you would do some simple, calculator-like operations with MATLAB:

```
>> a=3; b=5; a+b, c=a*b, d1=a/b, d2=a\b
ans =
     8
c =
    15
d1 =
    0.6000
d2 =
    1.6667
```

As you see, MATLAB supports all the basic arithmetic operations: +, -, *, /, ^, etc.; and you can group and order operations by enclosing them in parentheses. However, what exactly is ans above? In short ans is short for "answer", and is used in MATLAB as the default variable name when none is specified. You can refer to that value by just typing ans. The ans variable by itself isn't that useful, but the real power is that you can define and use your own variables such as a, b and c in the above example.

If you type an expression and then follow it with a semicolon, then MATLAB will evaluate the expression and store the result internally, but it will not print out the results in the MATLAB command window for you to see. This might not seem to be very useful, but it is actually quite handy and used all the time. You will mainly be concerned only with some final result in your MATLAB sessions, which will be calculated by combining many temporary, intermediate variables. And by appending a semicolon to the expressions that assign values to the temporary, intermediate

variables causes their results to not be printed. For example, in the above example semicolons were typed after the definitions for the variables a, and b; the final result, a+b and c was important and a semicolon was thus not added after these expressions, causing its result to be printed.

1.3 Format

Matlab displays numerical results with approximately four digits to the right of the decimal point but we can override this default behavior by specifying a different numerical format as follow

<code>format rat</code>	305/6
<code>format short</code>	50.833
<code>format long</code>	50.83333333333334
<code>format short e</code>	5.0833e+001
<code>format long e</code>	5.083333333333334e+001

Also one can control the width and precision of the output by using `fprintf` command as an example let $x = 12.55$, $y = x^2$, $z = 1/x$

```
>> x=12.55; y=x^2; z=1/x;
>> fprintf('x= %10.5e, y= %15.7f, z= %12.6f\n',x,y,z)
x= 1.25500e+001, y=      157.5025000, z=      0.079681
```

You can find more if you type `help fprintf`.

1.4 Variable Names and Assigning Strings to Variables

There are some specific rules for what you can name your variables, so you have to be careful.

- Only use primary alphabetic characters (i.e., "A-Z"), numbers, and the underscore character (i.e., "_") in your variable names.

- You cannot have any spaces in your variable names, so, for example, using "this is a variable" as a variable name is not allowed, but "this_is_a_variable" is fine (in general, you can use the "_" character wherever you would use space to string words together in your variable name).
- MATLAB is case sensitive. What this means for variables is that the same text, with different mixes of capital and small case letters, will not be the same variables in MATLAB. For example, "A_VaRIAbLe", "a_variable", "A_VARIABLE", and "A_variable" would all be considered distinct variables in MATLAB.

Some special variables and constants are:

ans	Most recent answer.
eps	Floating point relative accuracy.
pi	π
inf	∞
NaN	Not a number.

Some Common Mathematical Function:

abs(x)	Absolute value	sqrt(x)	Square root
sin(x)	Sine	asin(x)	Inverse sine
cos(x)	Cosine	acos(x)	Inverse cosine
tan(x)	Tangent	atan(x)	Inverse tangent
log(x)	Natural logarithm	exp(x)	Exponential
log10(x)	Base 10 logarithm	sign(x)	Signum function

A lines starting with % --- is a *comments*. Comments are completely ignored by MATLAB during execution, and are intended solely as comments to the user.

Comments are a way for you to document important points about your scripts, so for example, if you put away some script file for a long time and then come back to it later you can be quickly and easily reminded of what it is you were trying to do, and how to use the script; comments are also very useful in helping others to understand your scripts.

Some good advice: make liberal use of comments in your scripts. Note that another good reason to use comments is that the comments you place at the beginning of your scripts (called the header --- the header includes all comment lines

up to the first command) will be returned to users when they get help for your script; thus, you should always try to place information about what your script is about and how to use it as comment lines at the beginning of your scripts.

Exercises

1. Do the following calculations:

(i) $\sqrt{3}$ (ii) $\cos(\pi/6)$ (iii) $\sin^2(\pi/6) + \cos(\pi/3)^2$ (iv) $\frac{1}{2+3^2} + \frac{4}{3}$

(v) $e^3 + \ln\sqrt{5} - \log 7.4$ (vi) $|\sin(5\pi/3)|$ (vii) $\text{factor}(123)$

2. Find the value of the expression $y = e^{-a} \tan x + 10y^{3/2}$ for $a = 5$, $x = 3$ and $y = 8$.

3. Evaluate the area and circumference for a circle with radius $3/5$

4. Find the volume and surface area of the sphere with radius 3.12