COMPUTER SYSTEMS & PROGRAMMING

Introduction to MATLAB

Zuhaib A. Shaikh,
Asst. Prof., CSE Deptt.,QUEST
Web: zuhaib-shaikh.neocities.org

Introduction

- Product of MathWorks
- Stands for MATrix LABoratory
- Initially developed to simulate Matrix operations but later upgraded to implement all mathematical models
- Used to implement/simulate systems with particular mathematical model
- high-level language and interactive environment for numerical computation, visualization, and programming
- Used to
  - Analyze data
  - Develop algorithms
  - Develop models and applications
- Provides
  - Compiler
  - Interpreter
- Windows
  - Command Window
  - Figure Window
  - Program Window or Editor

Commands

- Basic
  - clear – clear workspace
  - clc – clear command window
  - help – provides help
  - exit – exit from MATLAB
  - editor – programming window
  - % – comments
  - ; – to prevent output
- Arrays/Vectors can be creating using square brackets
  - elements are separated by space or comma
  - Rows are separated by semicolon
- Arrays/Vectors can be addressed using their index via small brackets
  - Colon in the index can be used to show continuity
- Colon can also be used to generate sequence of numbers
  - Start:end or start:increment:end
- linspace function can be used to generate sequence
  - linspace (start, end, number_of_elements)

Matrix Commands

Transpose	B = A’
Identity Matrix	eye(n): returns an n x n identity matrix eye(m,n): returns an m x n matrix with ones on the main diagonal and zeros elsewhere. Zeros(n): returns a n x n zeros matrix Ones(n): return a n x n ones matrix
Addition and subtraction	C = A + B C = A – B
Matrix Multiplication	C = A*B
Matrix Inverse	B = inv(A), A must be a square matrix in this case.
Matrix Powers	B = A.^2: squares each element in the matrix C = A * A: computes A*A, and A must be a square matrix.
Determinant	det (A), and A must be a square matrix.
Size	size(A) : returns size of matrix

Plot Command

- Plot command is used to represent plot point(s) on figure window
  - plot(x, y , 'linestyle_color_shape')

b	blue	.	point	-	solid
g	green	o	circle	:	dotted
r	red	x	x-mark	-.	dashdot
c	cyan	+	plus	--	dashed
m	magenta	*	star	(none)	no line
y	yellow	s	square		
k	black	d	diamond		
w	white	v	triangle (down)		
		^	triangle (up)		
		<	triangle (left)		
		>	triangle (right)		
		p	pentagram		
		h	hexagram		

- Figure window can be opened/closed separately
  - figure (number)
  - close(number)

Plot Command

- Variants
  - semilogx (x,y) to generate plot using logarithmic scale of x
  - semilogy (x,y) to generate plot using logarithmic scale of y
  - loglog (x,y) to generate plot using logarithmic scale of x & y

- Other commands
  - subplot(m,n,p) – divide figure window in mxn sub windows where p is selected window
  - hold on – select graph window to work without loosing previous graph
  - hold off – releasing graph window
  - grid on – to enable grid
  - grid off – to disable grid
  - title('text') – to assign title to graph window
  - xlabel ('text') – to assign text to x-axis
  - ylabel ('text') – to assign text to y-axis
  - Xlabel ('text') – to assign text to z-axis
  - text(x,y,'text') – to assign text on graph window on x,y location
  - mesh(x,y,z) – plots a three-dimensional wire-frame mesh shape

Questions