Introduction to Scilab

Deepak U. Patil

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Outline

Defining a matrix

- In Scilab, Everything you define is stored as a matrix.
- A=[1 0 0;1 2 0;1 1 3]
- det(A)
- spec(A)
- a=[1 2 3] and b=[2 3 4].
- a*b
- a.*b
- a'*b
- a*b'
- size(a)
- length(a)
- diag(a)

Submatrix extraction

- k=1:5 gives k=[1 2 3 4 5]
- k=1:2:9 gives k=[1 3 5 7 9]
- A=[1 2 3 4;1 3 5 7;2 4 6 8]
- A(:,1) is first column
- A(2,:) is second row
- A(2,4) is the entry at second row, fourth column.

Submatrix extraction contd.

- A([1,3],[2,4])
- A(1:3,2:4)
- $ stands for last index
- A(1:$,2:$) will yield same result as A(1:3,2:4)

System of linear equations

Example

2x+y=6 and x+y=2

- x=A\b
- [x,ker]=linsolve(A,b)
- x=lsq(A,b)

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2x+y=6

- x=A\b
- [x,ker]=linsolve(A,b)
- x=lsq(A,b)

System of linear equations

Example

2x+y=6,x+y=2 and x-y=2

- x=A\b
- [x,ker]=linsolve(A,b)
- x=lsq(A,b)

Example

2x+y=6,x+y=2 and 3x+y=10

- x=A\b
- [x,ker]=linsolve(A,b)
- x=lsq(A,b)

Defining a linear system

- s=%s
- typeof(s)
- N=s+1
- D=s^2+5*s+6
- H=syslin('c',N,D)
- typeof(H)
- H=syslin('c',A,B,C,D)

Simulating a system

- t=0:0.1:5;
- y=csim('step',t,H)
- plot(t,y)
- u=sin(t)
- y=csim(u,t,H)
- plot(t,[u;y])

Rootlocus/Bode plot/Nyquist plot

- evans(H)
- bode(H)
- nyquist(H).

For Further Reading I

"Modeling and Simulation in Scilab/Scicos" by Stephen L.Campbell, Jean-Philippe Chancelier and Ramine Nikoukah, (Springer)