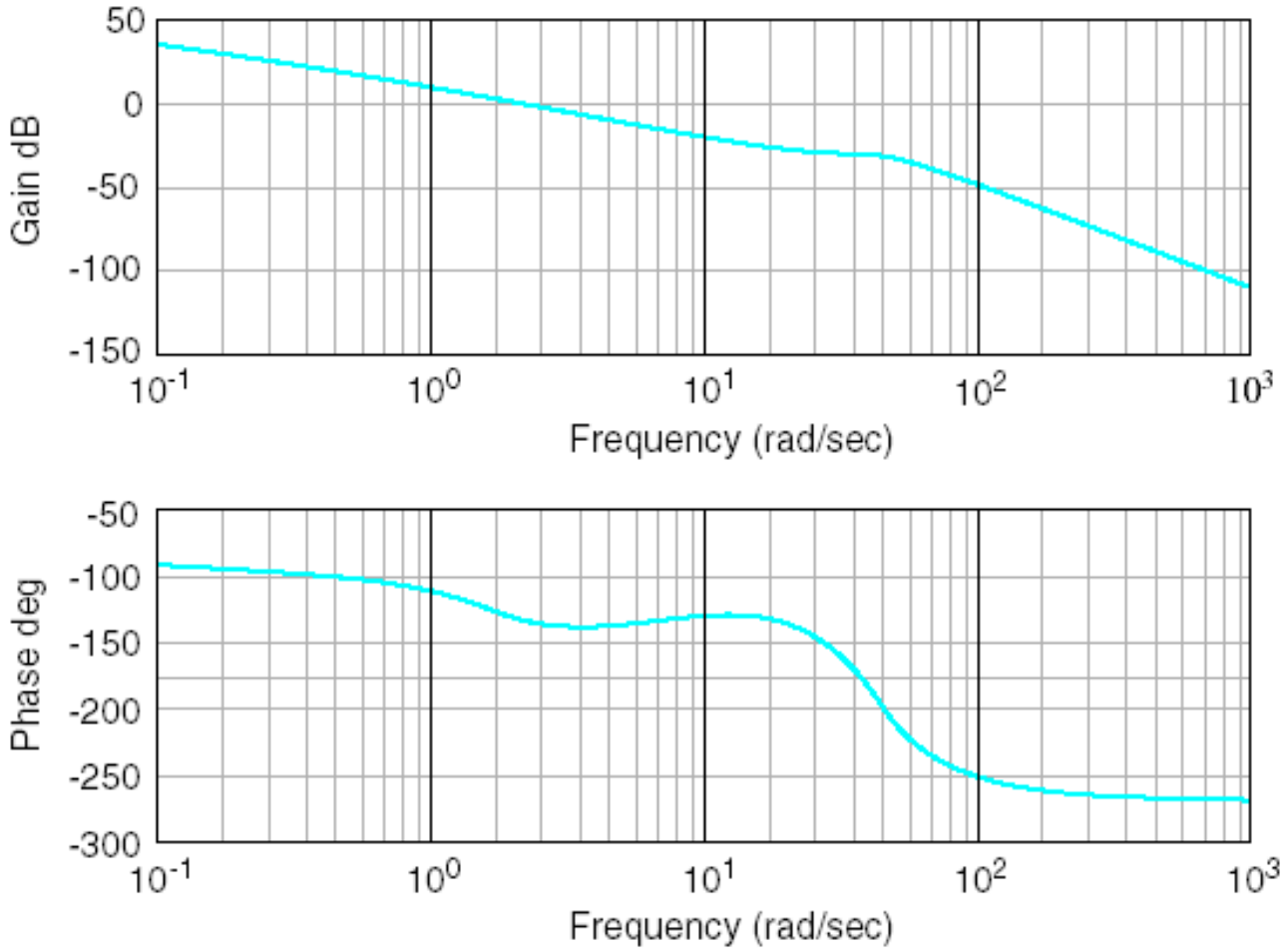
UNIT-5

(Lecture-3)

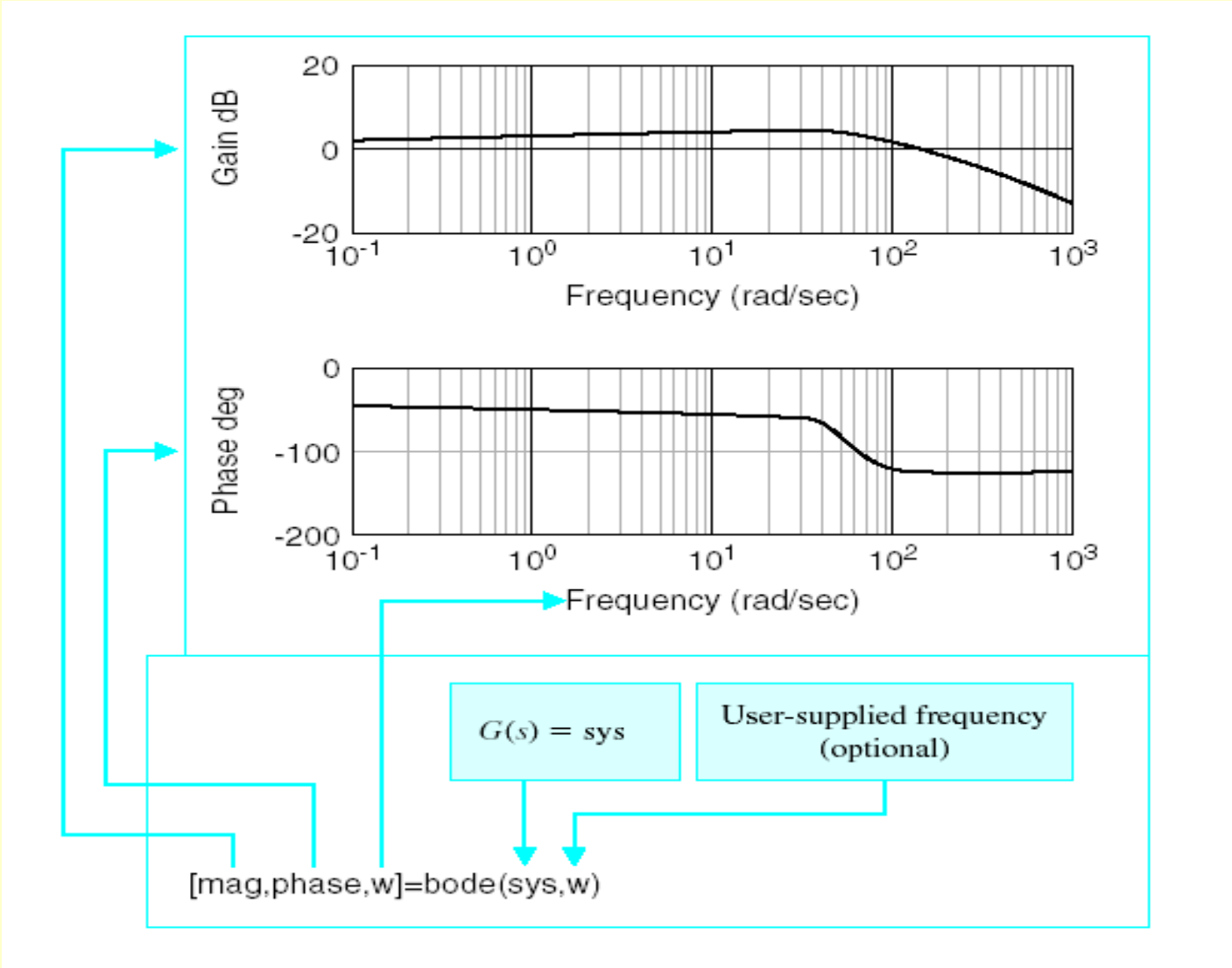
Frequency Response Methods

Using MATLAB

Frequency Response Methods Using MATLAB



Frequency Response Methods Using MATLAB



Frequency Response Methods Using MATLAB

n points between 10^a and 10^b

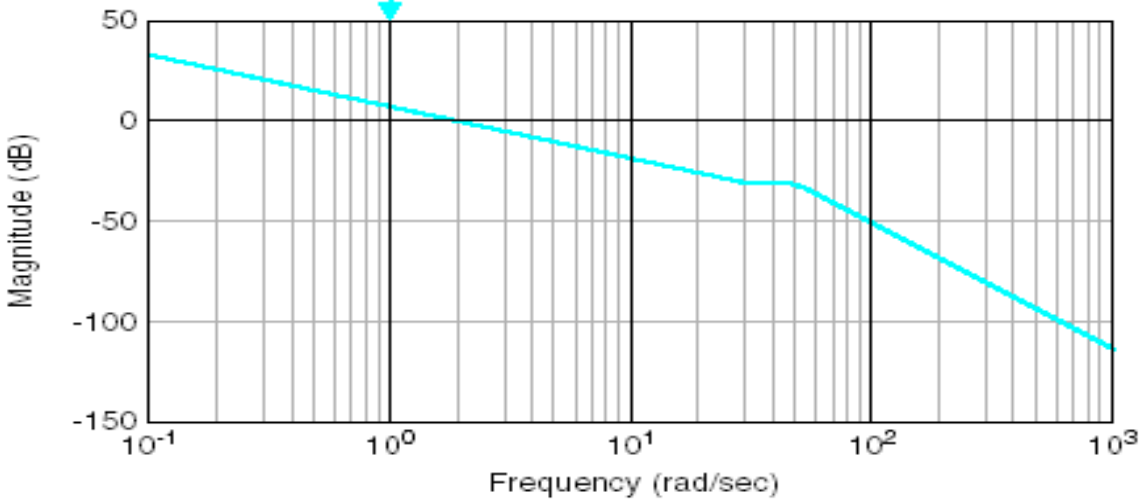
w=logspace(a,b,n)

Logarithmically spaced vector

Example

Generate 200 points between 0.1 and 1000.

```
>>w=logspace(-1,3,200);
>>bode(sys,w);
```



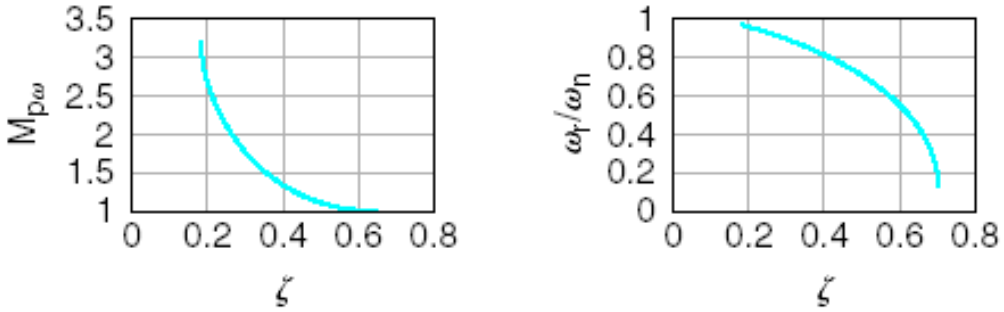
Frequency Response Methods Using MATLAB

```
% Bode plot script for Figure 8.22
%
num=5*[0.1 1];
f1=[1 0]; f2=[0.5 1]; f3=[1/2500 .6/50 1];
den=conv(f1,conv(f2,f3));
%
sys=tf(num,den);
bode(sys)
```

Compute

$$s(1+0.5s)\left(1+\frac{0.6}{50}s+\frac{1}{50^2}s^2\right)$$

Frequency Response Methods Using MATLAB



(a)

```
zeta=[0.15:0.01:0.7];
wr_over_wn=sqrt(1-2*zeta.^2);
Mp=(2*zeta .* sqrt(1-zeta.^2)).^(-1);
%
subplot(211),plot(zeta,Mp),grid
xlabel('\zeta'), ylabel('M_{p\omega}')
subplot(212),plot(zeta,wr_over_wn),grid
xlabel('\zeta'), ylabel('\omega_r/\omega_n')
```

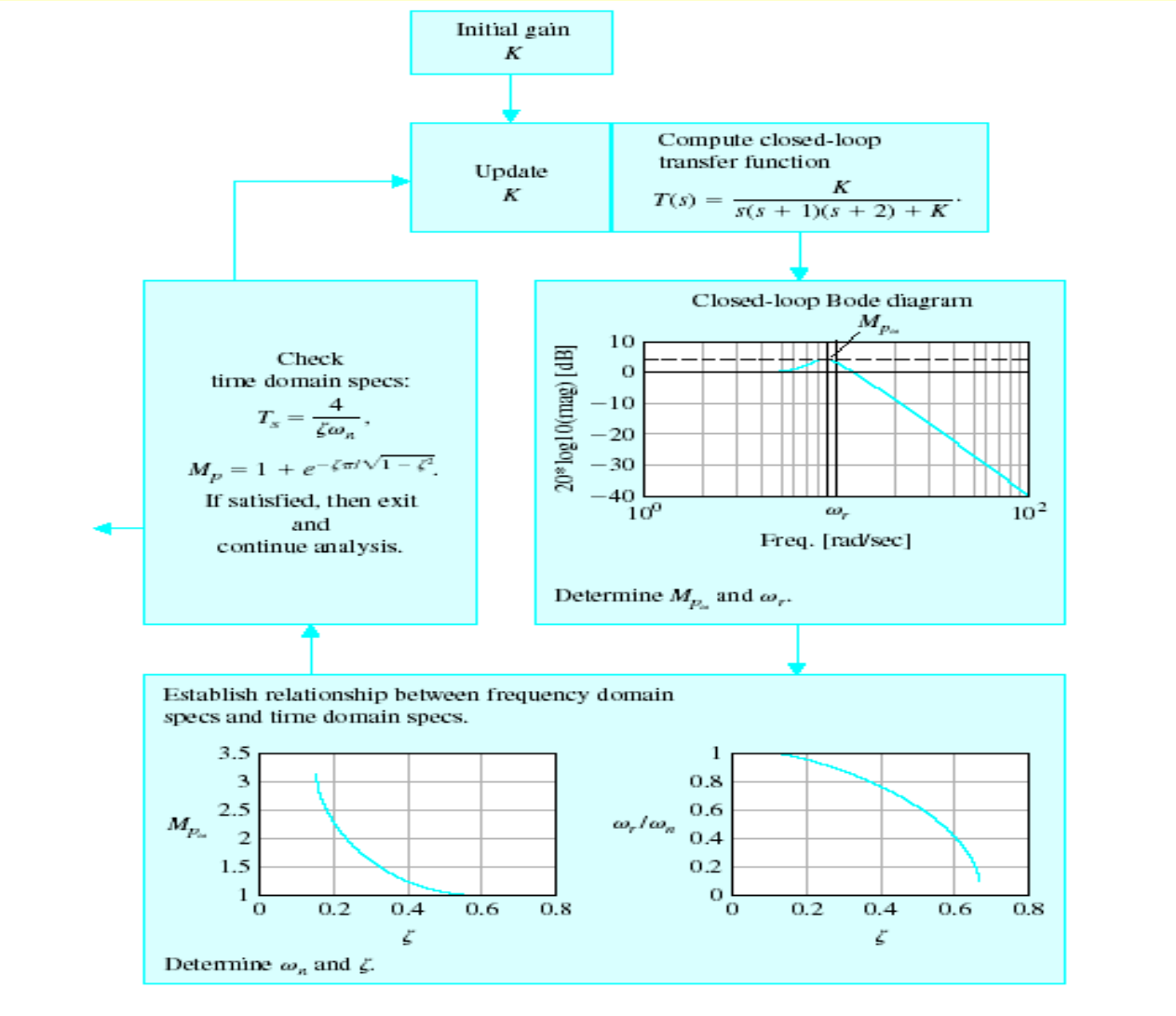
zeta ranges from 0.15 to 0.70

Generate plots

(b)

(a) The relationship between (M_{p_ω}, ω_r) and (ζ, ω_n) for a second-order system. (b) MATLAB script.

Frequency Response Methods Using MATLAB



Frequency Response Methods Using MATLAB