

Bode Plots

File: Ch14_BodePlot.m

Contents

- [How to Specify a Transfer Function](#)
- [Set plot options](#)
- [Specify Frequency Range](#)
- [DIY Bode plots](#)

How to Specify a Transfer Function

```
Gp = tf([0.2],[1 1.5 1], 'OutputDelay',0.25, 'TimeUnit', 'minutes')
```

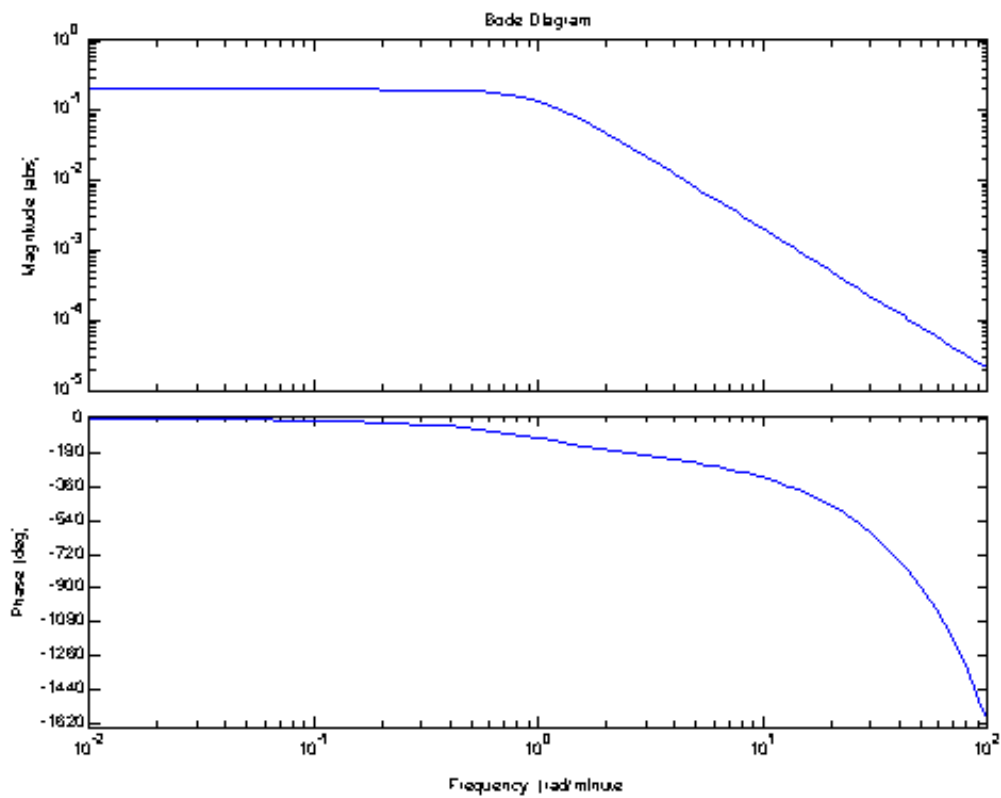
Gp =

$$\exp(-0.25s) * \frac{0.2}{s^2 + 1.5 s + 1}$$

Continuous-time transfer function.

Set plot options

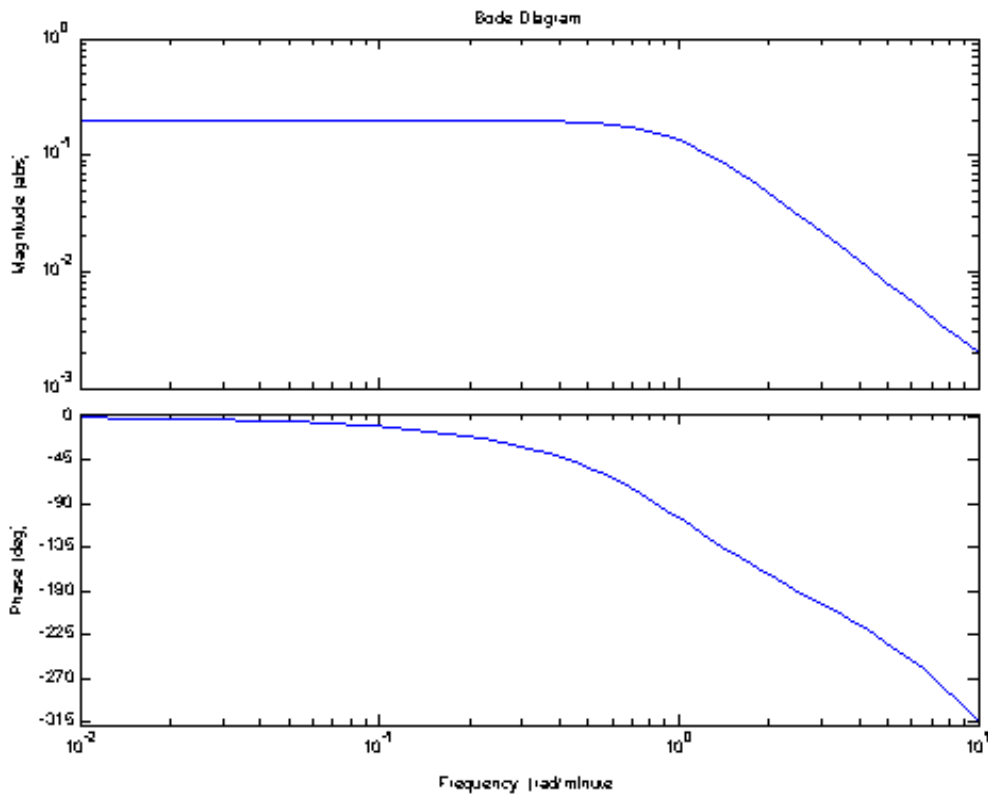
```
p = bodeoptions;  
p.MagUnits = 'abs';  
p.MagScale = 'log';  
p.FreqUnits = 'auto';  
  
bodeplot(Gp,p);
```



Specify Frequency Range

Sometimes it is useful to control the frequency range which will be displayed on the Bode plot.

```
w = logspace(-2,1);  
bodeplot(Gp,w,p);
```



DIY Bode plots

```

% Calculate amplitude ratio and phase

[AR,phase] = bode(Gp,w);

% bode returns multidimensional arrays. Convert to vectors for plotting

AR = AR(:);
phase = phase(:);

% Plot

figure(1);clf;
subplot(2,1,1);
loglog(w,AR);
xlabel('Frequency [rad/min]');
ylabel('Amplitude Ratio');
title('Bode plot');
grid;

subplot(2,1,2);
semilogx(w,phase);
xlabel('Frequency [rad/min]');
ylabel('Phase [deg]');
grid;

% Draw line for finding cross-over frequency

```

```
hold on;  
ax = axis;  
plot(ax(1:2), [-180;-180], 'r--');  
hold off
```

