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## Handout 10: Notch compensation

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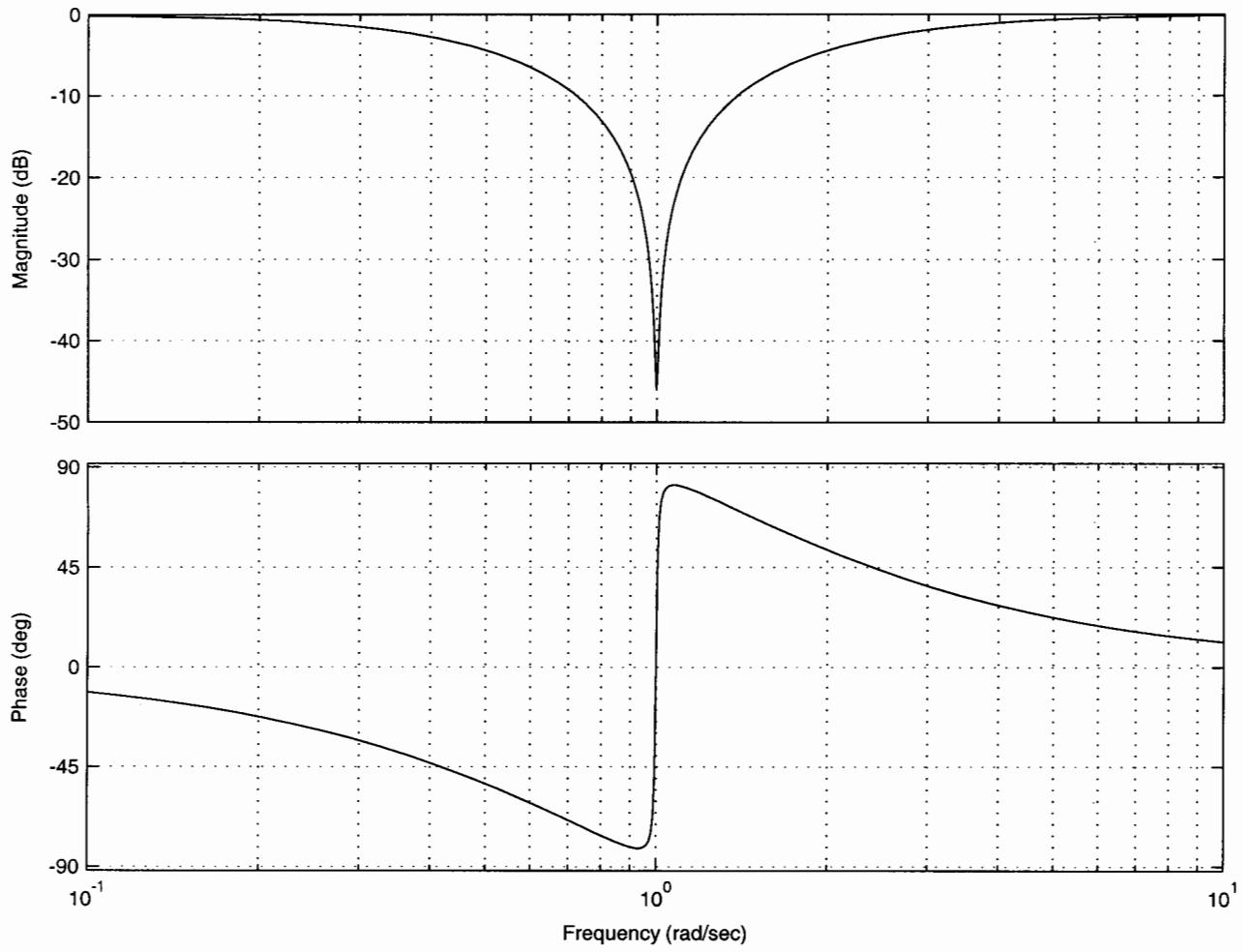
**Notch Compensation goals:** Kill nasty frequencies (eg resonant frequencies).

**Canonical Notch element:**

$$K_{notch}(s) = \frac{(s/\omega)^2 + 2\zeta(s/\omega)s + 1}{(s/\omega + 1)^2}$$

**Bode plot of Notch element**

Bode Diagram



**General Notch filter format:**

$$K_{notch}(s) = \frac{(s/\omega)^2 + 2\zeta(s/\omega)s + 1}{(s/\omega)^2 + 2\gamma(s/\omega)s + 1}$$

**Using Notch Compensation**

**Plant under study:**

$$G(s) = \frac{s^2 + 1}{s^2(s^2 + 2)}$$

Requirements: Want to have good tracking, decent PM.

**Draw physical system and OL transfer function here**

**Compensation Scheme:** Use lead compensation

Phase Margin is

Gain Margin is

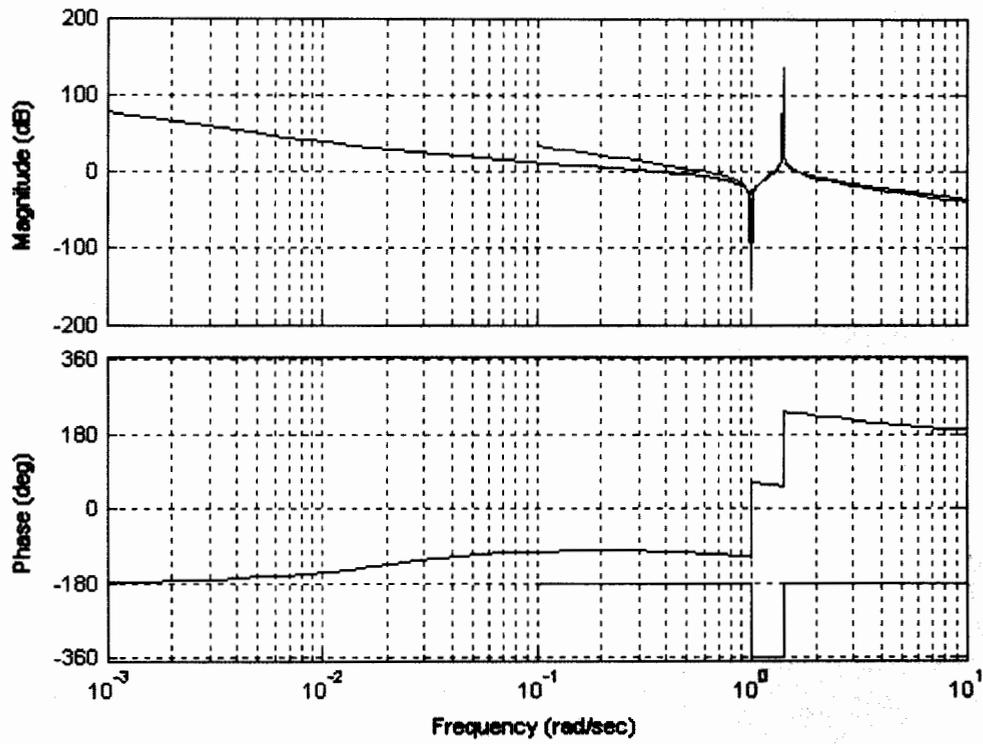
BW is

Notch compensation:

Root-locus

Bode diagram

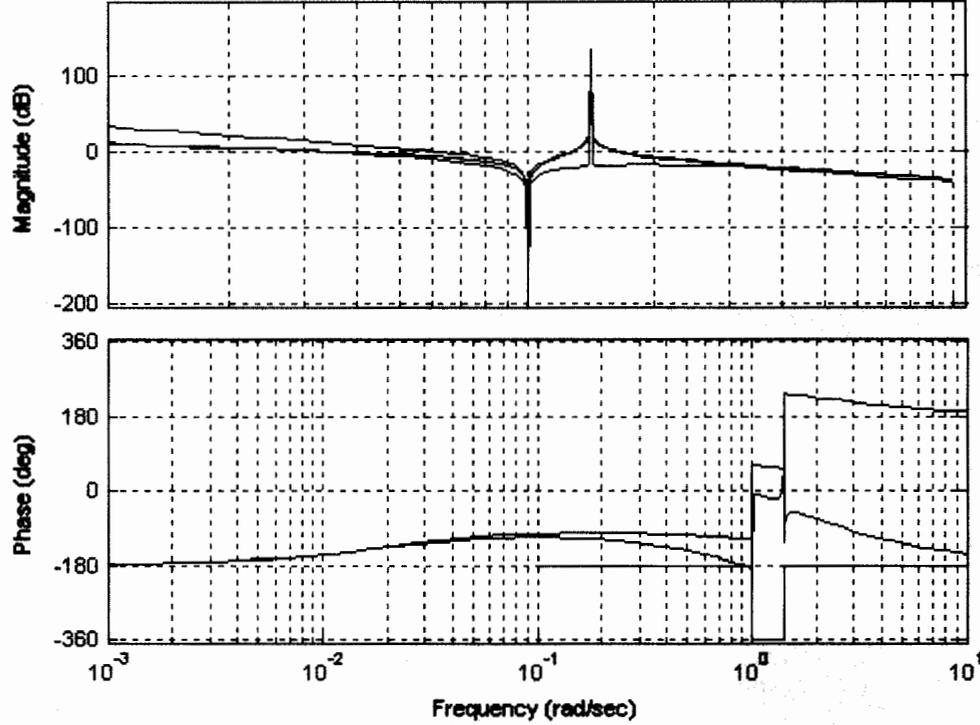
$K=1/62.5$   $a=0.02$   $b=2$  Bode Diagram



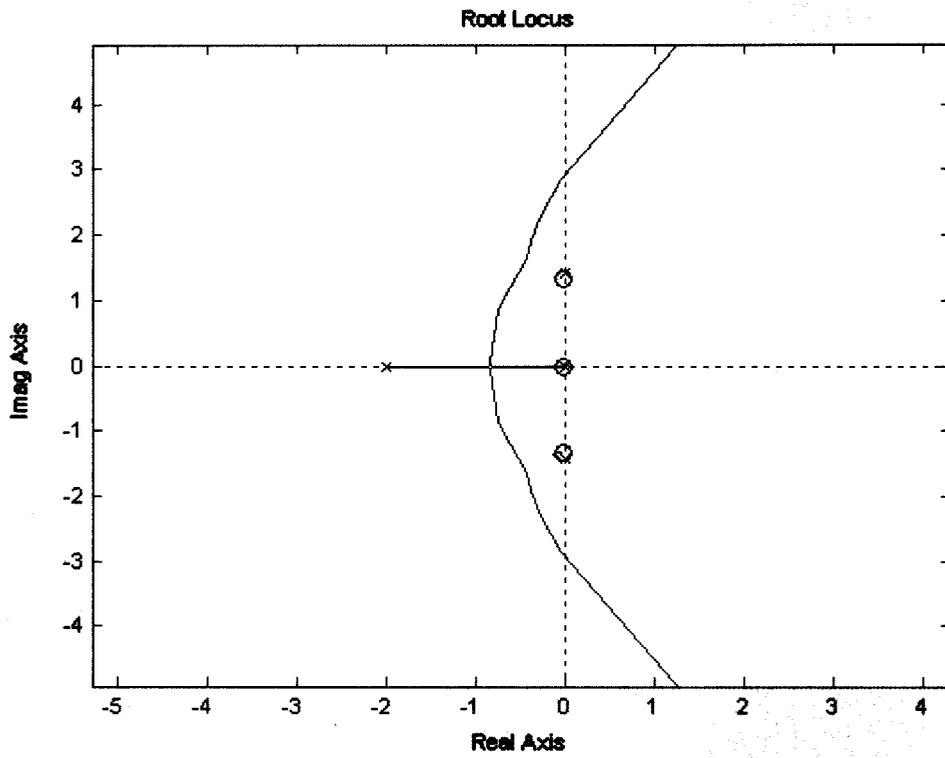
$K=1/62.5$   $a=0.02$   $b=2$

$\omega_n=1.414$   $\zeta=0.0141$

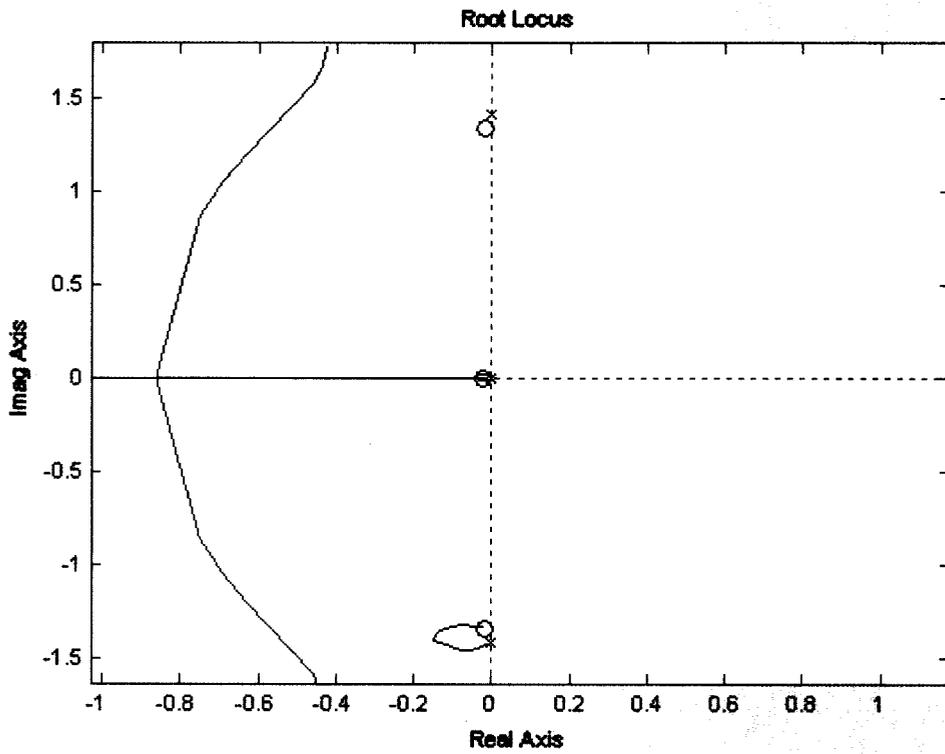
Bode Diagram



With lead and notch compensation



With lead and notch compensation



Bode Diagram

