

bodas is used to draw the asymptotic Bode plots (magnitude and phase) of a system with the following form:

$$G(s) = K \frac{(s+z_1)(s+z_2) \dots (s+c_1)(s+\bar{c}_1)(s+c_2)(s+\bar{c}_2) \dots}{(s+p_1)(s+p_2) \dots (s+d_1)(s+\bar{d}_1)(s+d_1)(s+\bar{d}_1) \dots}$$

where:  $K, z, p \in \mathbb{R}$  and  $c, d \in \mathbb{C}$ .

For example, we want draw the asymptotic Bode plots of the following system:

$$G(s) = -100 \frac{s}{s^2 + 12s^2 + 21s + 10}$$

First, we modify  $G(s)$  as follows:

$$G(s) = -100 \frac{(s+0)}{(s+1)(s+1)(s+10)}$$

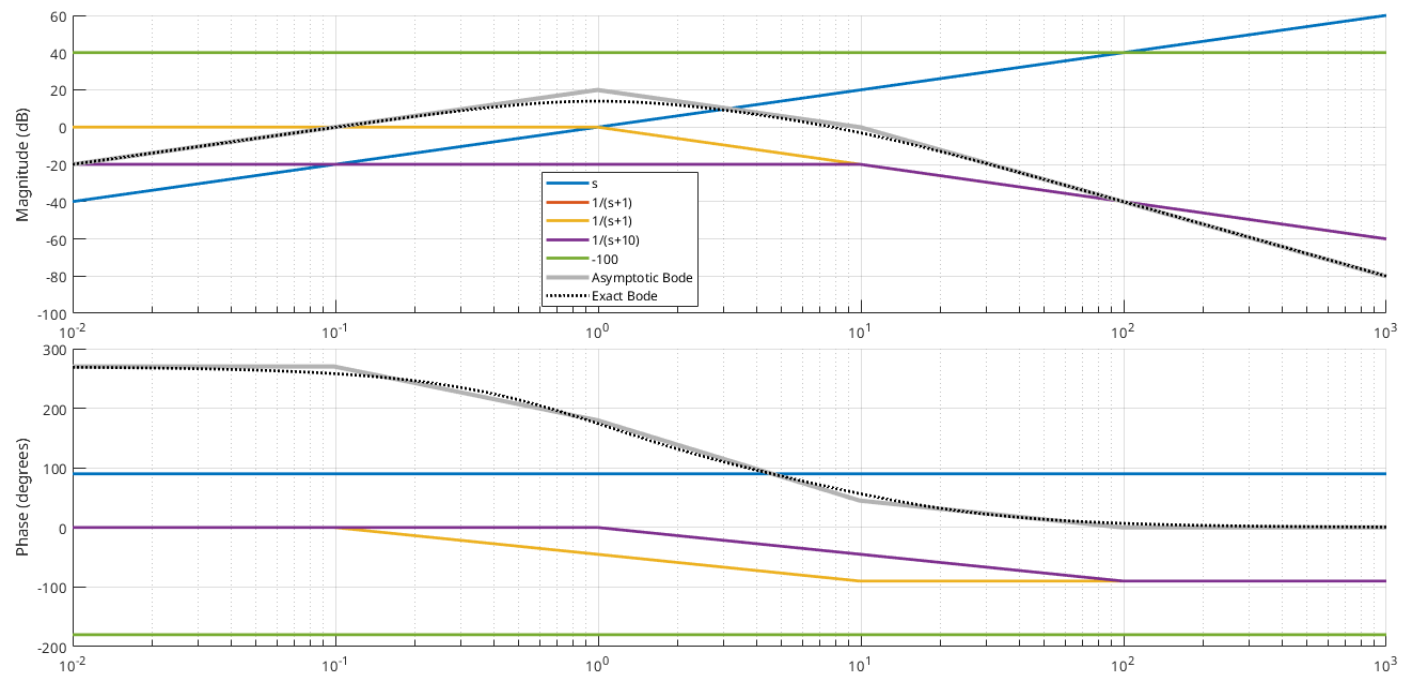
Next, we collect  $z$ ,  $p$ , and  $K$ , as follows:

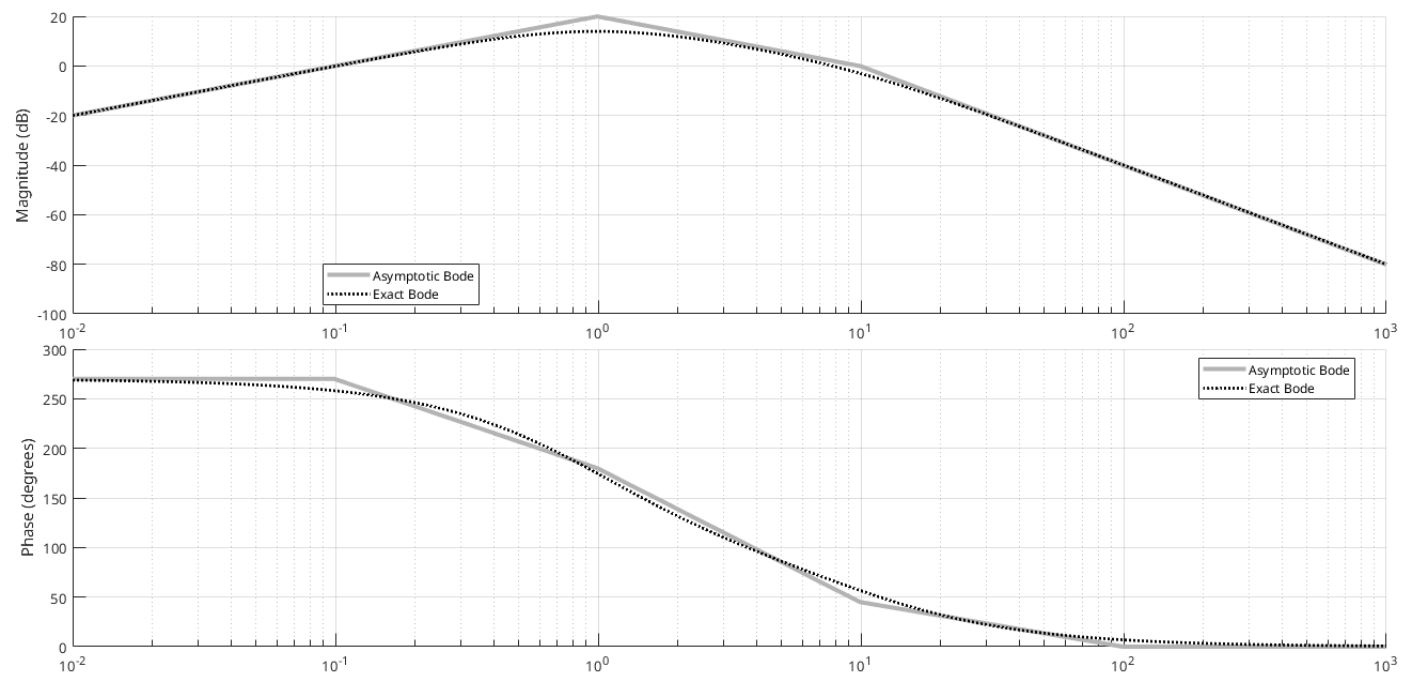
```
z = [0];  
p = [1 1 10];  
K = -100;
```

To draw the asymptotic Bode plot, we simply use:

```
bodas(z, p, K);
```

The result is as follows:





Now, let us try a system with complex conjugate poles/zeros. For such a system, we only need to include one of the two poles/zeros.

$$G(s) = \frac{-s^2 - 0.2s - 4.01}{s}$$

We then decompose  $G(s)$  into the following form:

$$G(s) = \underbrace{(-1)}_{\text{Gain}} \underbrace{\frac{(s + 0.1 + 2i)(s + 0.1 - 2i)}{(s + 0)}}_{\substack{\text{one pair of complex-conjugate zeros} \\ \text{one pole at the origin}}}$$

Next, we collect  $z$ ,  $p$ , and  $K$ , as follows:

```
z = [0, 1+2i]; %only need to put one of the complex zeros!
p = [0];
K = -1;
```

To draw the asymptotic Bode plot, we simply use:

```
bodas(z, p, K);
```

The result are shown below.

