

Time delay

```
tau = 0.1;
[num,den] = pade(tau,2);
D1 = tf(num,den);
```

2nd order Pade approximation

$$e^{-0.1s} \approx \frac{s^2 - 60s + 1200}{s^2 + 60s + 1200} = D1(s)$$

4th order Pade approximation

```
tau = 0.1;
[num,den] = pade(tau,4);
D2 = tf(num,den);
```

$$e^{-0.1s} \approx \frac{s^4 - 200s^3 + 18000s^2 - 8.4e05s + 1.68e07}{s^4 + 200s^3 + 18000s^2 + 8.4e05s + 1.68e07} = D2(s)$$

$$D1(s) =$$

$$\frac{s^2 - 60s + 1200}{s^2 + 60s + 1200}$$

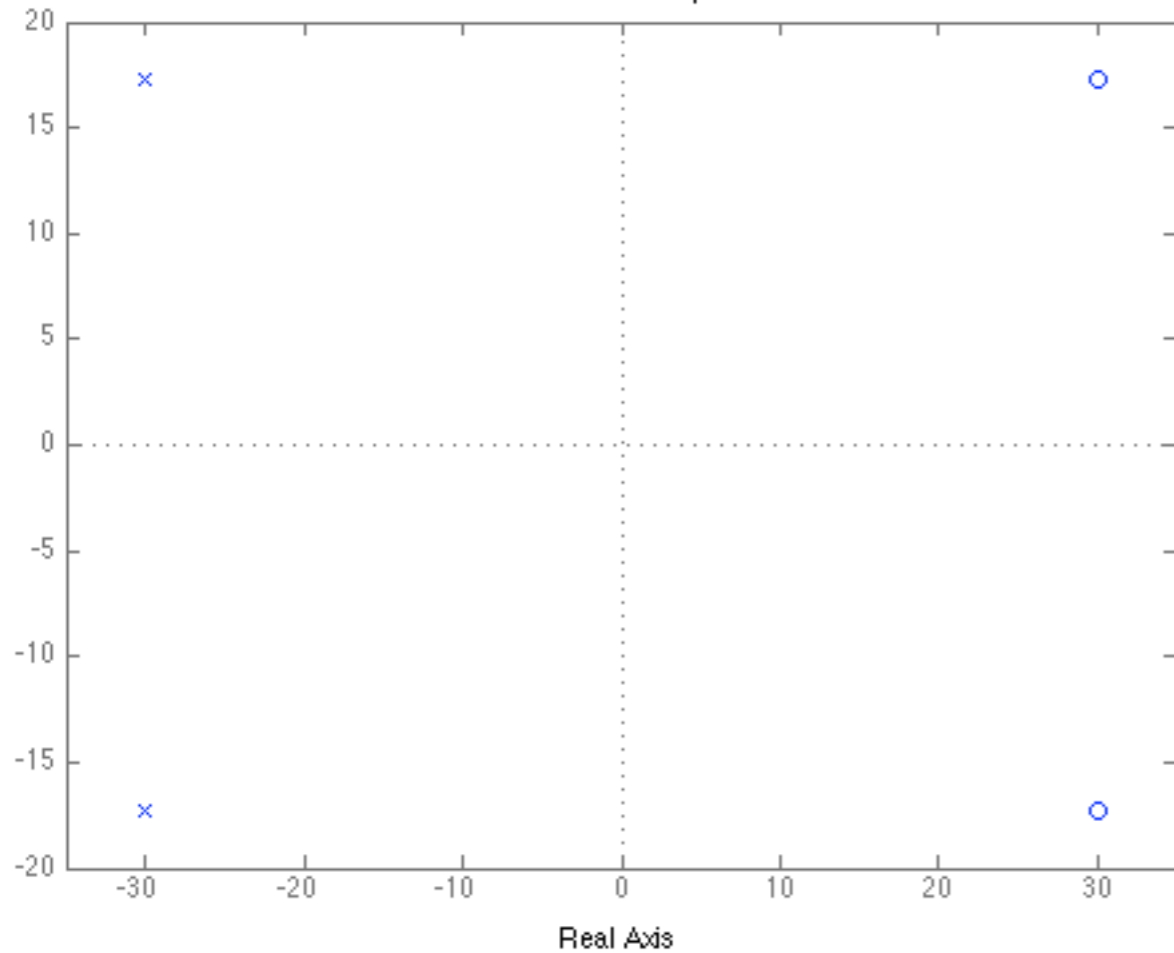
$$s^2 + 60s + 1200$$

$$D2(s) =$$

$$\frac{s^4 - 200s^3 + 18000s^2 - 8.4e05s + 1.68e07}{s^4 + 200s^3 + 18000s^2 + 8.4e05s + 1.68e07}$$

$$s^4 + 200s^3 + 18000s^2 + 8.4e05s + 1.68e07$$

Pole-Zero Map



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