Three Types of Factors

Transfer functions in Bode form will have three types of factors:

1. $K_0(j\omega)^n$, where n is a positive or negative integer
2. $(j\omega\tau + 1)^{\pm 1}$
3. $\left[\left(\dfrac{j\omega}{\omega_n}\right)^2 + 2\zeta\dfrac{j\omega}{\omega_n} + 1\right]^{\pm 1}$

In our example above,

$$
KG(j\omega) = \frac{3K}{4} \frac{\frac{j\omega}{3} + 1}{j\omega\left[\left(\frac{j\omega}{2}\right)^2 + \frac{j\omega}{2} + 1\right]}
$$

$$
= \underbrace{\frac{3K}{4}(j\omega)^{-1}}_{\text{Type 1}} \cdot \underbrace{\left(\frac{j\omega}{3} + 1\right)}_{\text{Type 2}} \cdot \underbrace{\left[\left(\frac{j\omega}{2}\right)^2 + \frac{j\omega}{2} + 1\right]^{-1}}_{\text{Type 3}}
$$

Now let's discuss Bode plots for factors of each type.