



Real Factors Frequency Response

Obtain the **expression** for the frequency **response** of the following **system** and discuss its **salient features**.

$$G(s) = \frac{10(s+1)}{(s+2)(s+5)}$$

$$\left| \frac{10(j\omega+1)}{(j\omega+2)(j\omega+5)} \right| = \frac{10 \times |j\omega+1|}{|j\omega+2| \times |j\omega+5|} = \frac{10\sqrt{\omega^2+1}}{\sqrt{\omega^2+4} \times \sqrt{\omega^2+25}}$$

$$|G(j0)| = 1; \quad |G(j1)| = 1.24; \quad |G(j2)| = 1.47; \quad |G(j5)| = 1.34; \quad |G(j\infty)| = 0$$

$$\angle \left| \frac{10(j\omega+1)}{(j\omega+2)(j\omega+5)} \right| = \angle 10 + \angle |j\omega+1| - \angle |j\omega+2| - \angle |j\omega+5|$$

$$\angle G(j0) = 0; \quad \angle G(j1) = 7.1^\circ; \quad \angle G(j2) = -3.4^\circ$$

$$\angle G(j5) = -34.5^\circ; \quad \angle G(j\infty) = -90^\circ$$



Complex Factor Frequency Response

Obtain **frequency response** expression for the following **system** and discuss its **phase** characteristics.

$$G(s) = \frac{10}{(s^2 + 0.8s + 9)}$$

$$\left| \frac{10}{((j\omega)^2 + j0.8\omega + 9)} \right| = \frac{10}{|(j\omega)^2 + j0.8\omega + 9|} = \frac{10}{\sqrt{(9 - \omega^2)^2 + (0.8\omega)^2}}$$

$$|G(j0)| = 1.11; \quad |G(j3)| = 4.17; \quad |G(j\infty)| = 0$$

$$\angle \left| \frac{10}{((j\omega)^2 + j0.8\omega + 9)} \right| = \angle 10 - \angle \frac{0.8\omega}{9 - \omega^2}$$

$$\angle G(j0) = 0; \quad \angle G(j3) = -90^\circ; \quad \angle G(j\infty) = -180^\circ$$