Fundamentals of Dynamics (11)

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Dynamic Absorber

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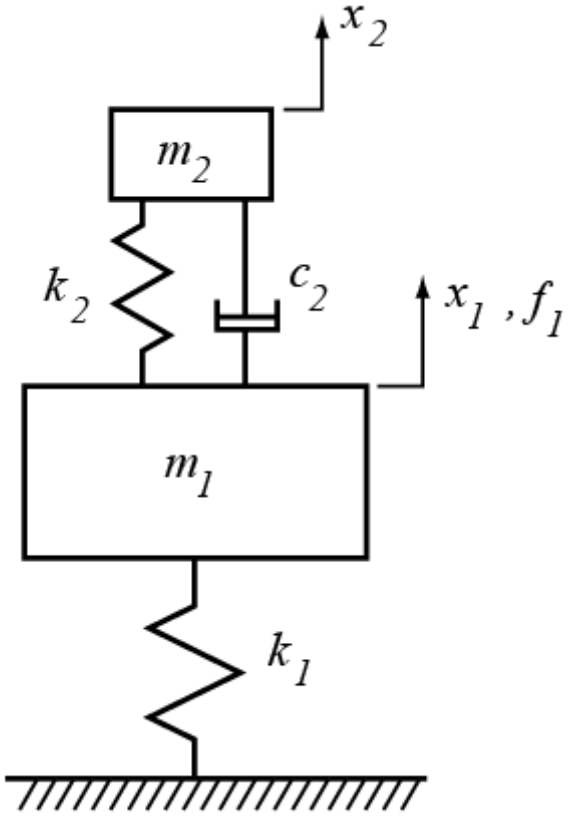
Analytical Model



$$m_1\ddot{x}_1 + c_2(\dot{x}_1 - \dot{x}_2)$$

$$+ k_1 x_1 + k_2(x_1 - x_2) = f_1$$

$$m_2\ddot{x}_2 + c_2(\dot{x}_2 - \dot{x}_1) + k_2(x_2 - x_1) = 0$$

$$\nu \equiv \frac{\omega_2}{\omega_1} = \sqrt{\frac{m_1 k_2}{m_2 k_1}}$$

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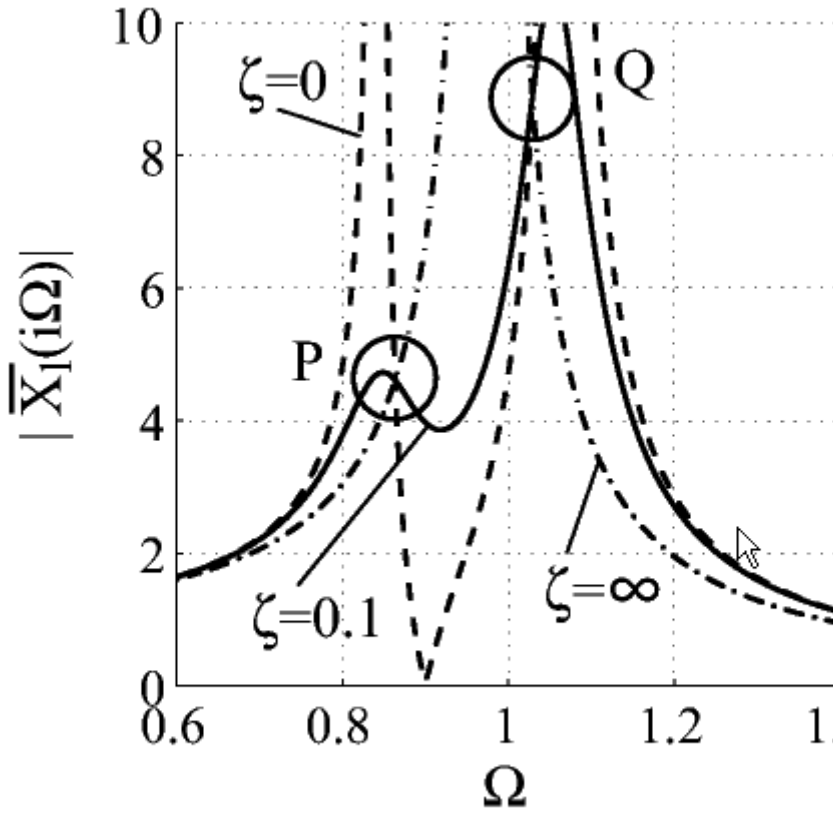
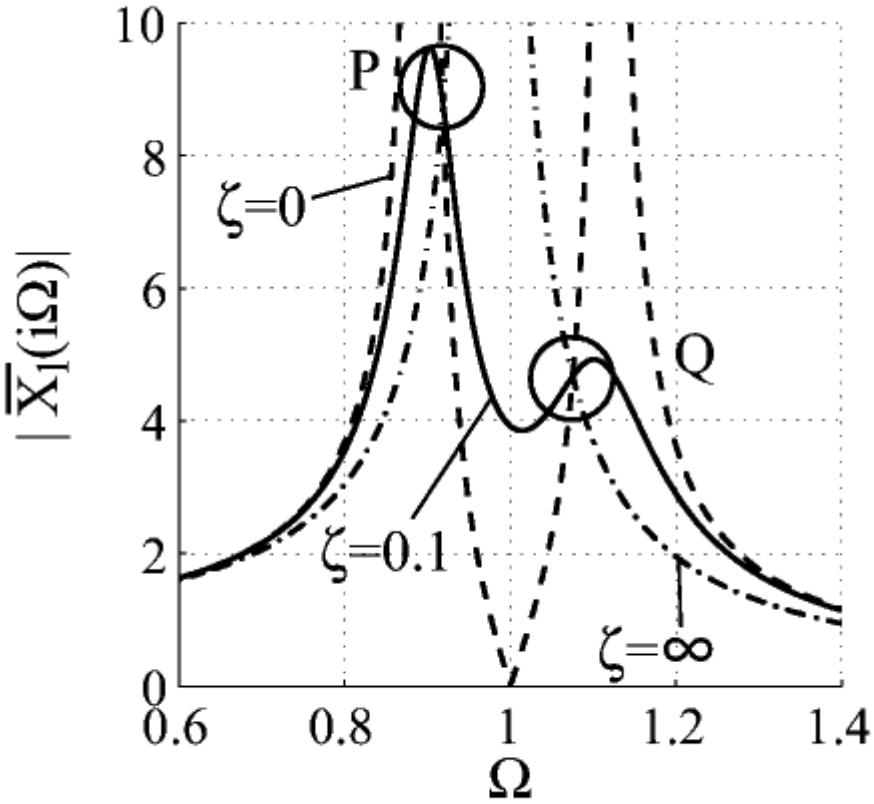
Dynamic Amplitude Ratio and Fixed Points



(a) $\nu = 0.9$



(b) $\nu = 1.0$

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Optimal Design

Fixed Points Theory

Optimal Tuning for k_2

$$\nu = \frac{1}{1+\mu} \quad \text{where} \quad \mu \equiv \frac{m_2}{m_1}$$

Best Adjustment for c_2

$$\zeta = \sqrt{\frac{3\mu}{8(1+\mu)^3}} \quad \text{where} \quad \zeta \equiv \frac{c_2}{2\sqrt{m_2 k_2}}$$

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