

[2.1절]

$$2.18 \quad \ddot{x}(t) + 4x(t) = 10 \cos 2t, \quad x(0) = 0, \quad \dot{x}(0) = 0$$

$$\omega_n^2 = 4 \quad \Rightarrow \quad \omega_n = 2 \text{ rad/s}, \quad \omega = 2 \text{ rad/s}, \quad f_0 = 10 \text{ N/kg}$$
$$\omega = \omega_n$$

$$x(t) = A_1 \sin \omega_n t + A_2 \cos \omega_n t + \frac{f_0}{2\omega} t \sin \omega t$$

$$\dot{x}(t) = \omega_n A_1 \cos \omega_n t - \omega_n A_2 \sin \omega_n t + \frac{f_0}{2\omega} \sin \omega t + \frac{f_0}{2} t \cos \omega t$$

$$x(0) = A_2 = 0$$

$$\dot{x}(0) = \omega_n A_1 = 0 \quad \Rightarrow \quad A_1 = 0$$

$$\frac{f_0}{2\omega} = \frac{10 \text{ m/s}^2}{2(2 \text{ rad/s})} = 2.50 \text{ m/s}$$

$$x(t) = \frac{f_0}{2\omega} t \sin \omega t = (2.50 \text{ m/s}) t \sin 2t$$