1. $\xi = 0.14$ 时

$$A(w) = \frac{1}{\sqrt{\left(1-\frac{w^2}{w_0^2}\right)^2 + \left(\frac{2\xi w}{w_0}\right)^2}} = 1.31$$

$$\varphi(w) = -\arctan \frac{2\xi \frac{w}{w_0}}{1-\left(\frac{w}{w_0}\right)^2} = -10.57^\circ$$

$$\gamma = \frac{|A(w)-1|}{1} \times 100\% = 31\%$$

$$\Delta\varphi = -\arctan \frac{2\xi \frac{w}{w_0}}{1-\left(\frac{w}{w_0}\right)^2} = -10.57^\circ$$

$\xi = 0.7$ 时. $A(w) = 0.97$

$\varphi(w) = -43^\circ$

$\gamma = \left|\frac{0.97-1}{1}\right| = 3\%$. $\Delta\varphi = -43^\circ$

2. (1) 一阶测量系统

(1) 令 $\frac{z}{s} = X$

$$\frac{mnP}{q}\frac{d}{dt}x + X = \phi$$

(2) $\tau = \frac{mnP}{q}$

(3) $\frac{mnP}{q} \cdot sX(s) + X(s) = \Phi(s)$

$$\frac{X(s)}{\Phi(s)} = \frac{1}{1+\frac{mnp}{q}s} = \frac{q}{q+mnp\cdot s}$$

$$\frac{X(jw)}{\Phi(jw)} = \frac{q}{q+mnp\cdot jw}$$

(4) τ 将减小 100 倍.

工作频带增大 100 倍.

3. (1) $\varepsilon = \left|\frac{1}{\sqrt{1+(w\tau)^2}} - 1\right| = 100\% \leq 5\%$

$w = 2\pi f = 200\pi$.

$\Rightarrow \tau \leq 5.2\times 10^{-4} s$

(2) $f' = 50Hz \Rightarrow \frac{w'}{2\pi} = 50 \Rightarrow w' = 100\pi$

$$\varepsilon_2 = \left|\frac{1}{\sqrt{1+(w\tau)^2}} - 1\right| \times 100\% = 1.32\%$$

$$\varphi = -\arctan(w\tau) = -9.3^\circ$$