称重传感器误差概述与分析

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【摘要】

【关键词】

一、概述

二、称重传感器主要单项误差分析

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$$\eta\left(\varepsilon\right)=\frac{\varepsilon_z-\varepsilon_0}{\varepsilon_0}=\frac{\left(\varepsilon_0+2\mu\varepsilon_0^2\right)-\varepsilon_0}{\varepsilon_0}=2\mu\varepsilon_0=0.56\varepsilon$$

$$\eta\left(\varepsilon\right)=\frac{\varepsilon_z-\varepsilon_0}{\varepsilon_0}=\frac{\left(\varepsilon_0-2\mu\varepsilon_0^2\right)-\varepsilon_0}{\varepsilon_0}=\ 2\mu\varepsilon_0=0.56\varepsilon$$

$$\eta\left(\varepsilon\right)=\frac{\varepsilon_Z-\varepsilon_0}{\varepsilon_0}=-\frac{48P^2L^5}{5E^2b^2h^6}$$

$$\frac{\Delta R}{R}=\varepsilon_R=CK\varepsilon$$

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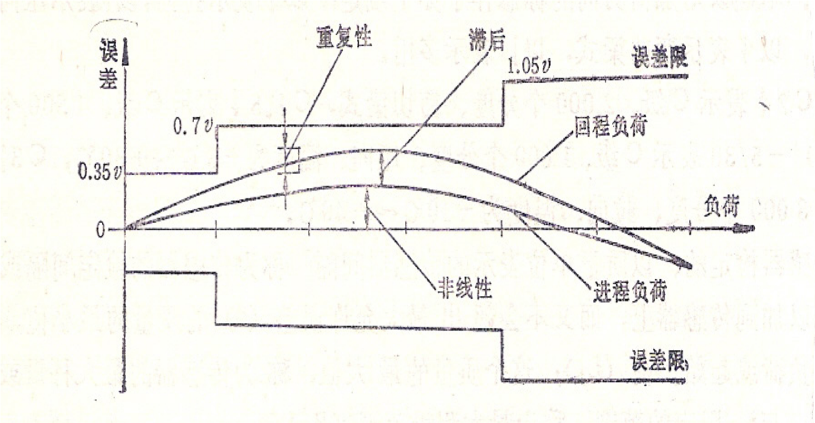
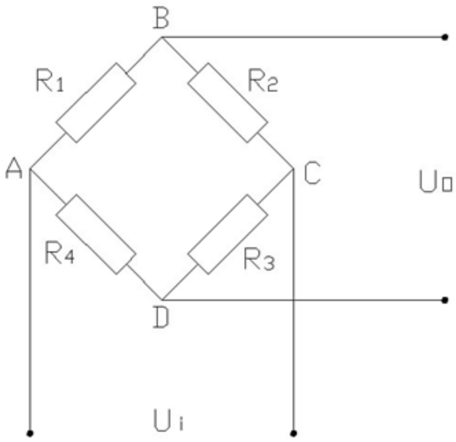


三、称重传感器温度误差分析

$$\frac{\Delta S_t}{S} = \gamma - 2\alpha_L - \beta_E$$

四、建立数学模型分析称重传感器的温度误差



$$R_i = R + r_i$$

$$U_0 = \frac{R_1 R_3 - R_2 R_4}{(R_1 + R_2)(R_3 + R_4)} \cdot U_i$$

$$U_0 = \frac{\left(R + r_1\right)\left(R + r_3\right) - \left(R + r_2\right)\left(R + r_4\right)}{\left(2R + r_1 + r_2\right)\left(2R + r_3 + r_4\right)} \cdot U_i$$

$$U_0 = \frac{\frac{R^2 r_1}{R} + \frac{R^2 r_3}{R} + r_1 r_3 - \frac{R^2 r_2}{R} - \frac{R^2 r_4}{R} - r_2 r_4}{4R^2 + 2R\left(r_1 + r_2 + r_3 + r_4\right) + \left(r_1 + r_2\right)\left(r_3 + r_4\right)} \cdot U_i$$

$$r_1' = \frac{r_1}{R} \qquad r_2' = \frac{r_2}{R} \qquad r_3' = \frac{r_3}{R} \qquad r_4' = \frac{r_4}{R}$$

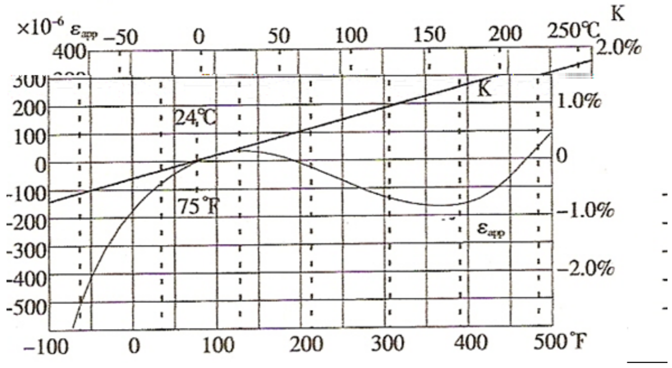
$$\alpha_1 = r_1 r_3 - r_2 r_4$$

$$\alpha_2 = \left(r_1 + r_2\right)\left(r_3 + r_4\right)$$

$$r_{sum} = r_1 + r_2 + r_3 + r_4$$

$$U_0 = \frac{R^2\left(r_1' + r_3' - r_2' - r_4'\right) + a_1}{4R^2 + 2Rr_{sum} + a_2} \cdot U_i$$

$$\varepsilon_{app} = \left[\frac{\alpha_R}{K_0} + \left(\alpha_m - \alpha_g\right)\right]\Delta T$$



$$d_{1r}\left(T\right)=A\left(B+b\right)$$

$$B=\left(\frac{T-T_C}{T_r}\right)\pi$$

$$d_{2r}\left(T\right)=mT+k$$

$$\begin{aligned}U_0 &= \frac{R_1R_3 - R_2R_4}{(R_1 + R_2)(R_3 + R_4)} \cdot U_i \\ &= \frac{(R + \Delta R_1)(R + \Delta R_3) - (R - \Delta R_2)(R - \Delta R_4)}{(2R + \Delta R_1 - \Delta R_2)(2R + \Delta R_3 - \Delta R_4)} \cdot U_i\end{aligned}$$

$$U_0 = \frac{U_i}{4} \cdot \frac{\dfrac{\Delta R_1}{R} + \dfrac{\Delta R_2}{R} + \dfrac{\Delta R_3}{R} + \dfrac{\Delta R_4}{R}}{1 + \dfrac{1}{2}(\dfrac{\Delta R_1}{R} - \dfrac{\Delta R_2}{R} + \dfrac{\Delta R_3}{R} - \dfrac{\Delta R_4}{R})}$$

$$\Delta R_1 = \Delta R_2 = \Delta R_3 = \Delta R_4 = \Delta R$$

$$U_0 = \frac{\Delta R}{R} U_i$$

U_0与$\dfrac{\Delta \mathrm{R}}{R}$

$$R_t = R_0(1 + \alpha_0 \Delta t)$$

$$\Delta R_t = R_t - R_0 = R_0\left(1 + \alpha_0 \Delta t\right) - R_0 = R_0 \alpha_0 \Delta t$$

$$R_1 = \Delta R_1 + \Delta R_t \qquad R_2 = \Delta R_2 + \Delta R_t$$

$$R_3 = \Delta R_3 + \Delta R_t \qquad R_4 = \Delta R_4 + \Delta R_t$$

$$U_0 = \frac{(\Delta R_1 + \Delta R_t)(\Delta R_3 + \Delta R_t) - (\Delta R_2 + \Delta R_t)(\Delta R_4 + \Delta R_t)}{(\Delta R_1 + \Delta R_2 + 2\Delta R_t)(\Delta R_3 + \Delta R_4 + 2\Delta R_t)} \cdot U_i$$

$$U_0 = \frac{\Delta R}{R + \Delta R_t} \cdot U_i$$

$$S = \frac{e}{U} = \frac{1 + \mu}{2} \cdot \frac{K}{EA} \cdot P$$

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