

## 1 Formula

Gauge Factor

$$G.e = \frac{\Delta R}{R}$$
$$\frac{\Delta R}{R} = \frac{\Delta \rho}{\rho} + (1 + 2k) \frac{\Delta L}{L} = G.e$$

RTD(Resistance Temperature Device)

$$R_T = R_0(1 + a_1T + a_2T^2 + \cdots + a_nT^n)$$

$$\epsilon(T) = R(T) - R(ideal)$$

Thermistor

$$R = R_0 e^{\frac{1}{\beta}(\frac{1}{T} - \frac{1}{T_0})}$$

Hamming Code

$$2^r = n + 1$$
$$r = 3.322 \log_2^n$$

## 2 Definition

- **Sensitivity:** Sensitivity is a measure of change in output of an instrument for a change in measurement input variable.
- **Resolution:** Resolution is smallest increment of measurand, which can be measured by instruments.
- **Nonlinearity:** Nonlinearity is defined as maximum deviation of any of output readings from the approximate transfer function.
- **Hysteresis:** Hysteresis is the deviation of sensor's output at a specified point of input signal, when the input signal is approached from opposite direction, it is expressed as maximum hysteresis.
- **MEMS:** Micro-Electro-Mechanical Systems. Micro-components integrated on a single chip, which allows the micro-system to control the system.

## 3 Tao Lu

### 3.1 Transient Response Analysis

1. Find the point with proper  $\frac{\omega}{\omega_n}$  and  $\zeta$

2. Read  $\frac{S}{S_0}$  from the graph
3. Find S
4.  $V = S \times a$ , where a is acceleration
5.  $V_{p-p} = 2 \times V$

### 3.2 RTD

1. Write down  $R_T = R_0(1 + a_1T + a_2T^2 + \dots + a_nT^n)$
2. Find R
3.  $\epsilon(T) = R(T) - R(ideal)$
4.  $\frac{d\epsilon(T)}{dT}$ , find  $T_0$
5. Find  $\epsilon(T_0)$
6.  $\epsilon(\%FSD) = \frac{\epsilon(T_0)}{R_{Max} - R_{Min}}$