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)

$$R_T = R_0(1 + a_1 T + a_2 T^2 + \cdots + a_n T^n)$$

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

Thermistor

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

Hamming Code

$$2^r = n + 1$$

$$r = 3.322 log_2^n$$

Accelerometer

Steady-state sensitivity

$$S_0 = \frac{Steady\ state\ voltage}{acceleration}$$

Unit: $\frac{V}{g}$

2 Definition

- **Sensitivity**: Sensitivity if a measure of change in output of an instrument for a change in measurement input variable.
- **Rosulution**: 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 ζ

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 $R_T = R_0(1 + a_1T + a_2T^2 + \cdots + a_nT^n)$
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. $\epsilon(\%FSD) = \frac{\epsilon(T_0)}{R_{Max} - R_{Min}}$