ERROR REDUCTION METHODS

- Compensating non-linear element
- Isolation
- Zero Environmental Sensitivity
- Opposite Environmental Input
- Differential System
- High Gain Negative Feedback
Compensating non-linear elements

- Uncompensated non-linear element
- Compensating non-linear element

Temperature

Resistance

Voltage

$R_\theta \, k\Omega$

$E_{Th} \, V$

298 348 $\theta \, K$

0 12 $E_{Th} \, V$

298 348 $\theta$
Isolation

$I_I$ and $I_M = 0$
Zero Environmental Sensitivity

\[ K_I \text{ and } K_M = 0 \]
Opposite Environmental Input

If $K_I = K'_I$

MUTEF ETE 303 Instrumentation and Measurement
Differential System

\[ C = 2KI \]
High-gain negative Feedback
Conclusion

- Methods which can only reduce the Interfering effects
  - Differential System
  - Opposing Environmental Inputs

- Methods which can only reduce the Modifying effects
  - High-gain Negative feedback

- Methods which can reduce both Interfering and Modifying effects
  - Companseting non-linear element
  - Isolation
  - Zero environmental sensitivity
Example 2:

Figure on the next page shows a block diagram of a force transducer using negative feedback. The elastic sensor gives a displacement output for a force input, the displacement sensor a voltage output for a displacement input. Vs is the supply voltage for the displacement sensor.

Calculate the output voltage Vo when
a) $Vs = 1V$ and $F = 50 N$,
b) $Vs = 1.5V$ and $F = 50 N$
c) Comment on the practical significance of the variation of the supply voltage $Vs$. 
Block diagram of the force transducer

\[ V_{out} = \frac{K^*KA}{1 + K^*KA KF} \times F_{in} \]