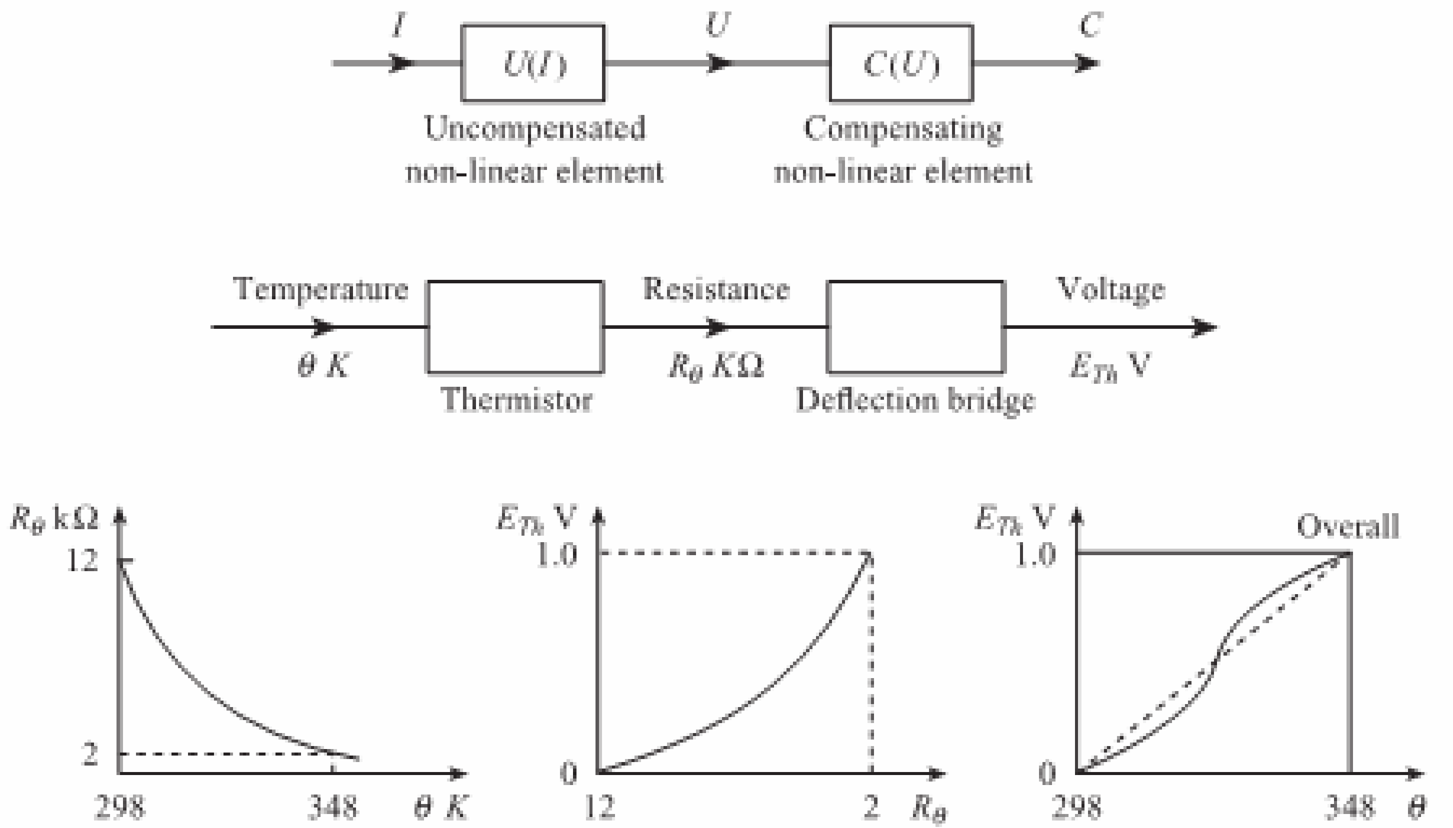
ERROR REDUCTION METHODS

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

Compensating non-linear elements



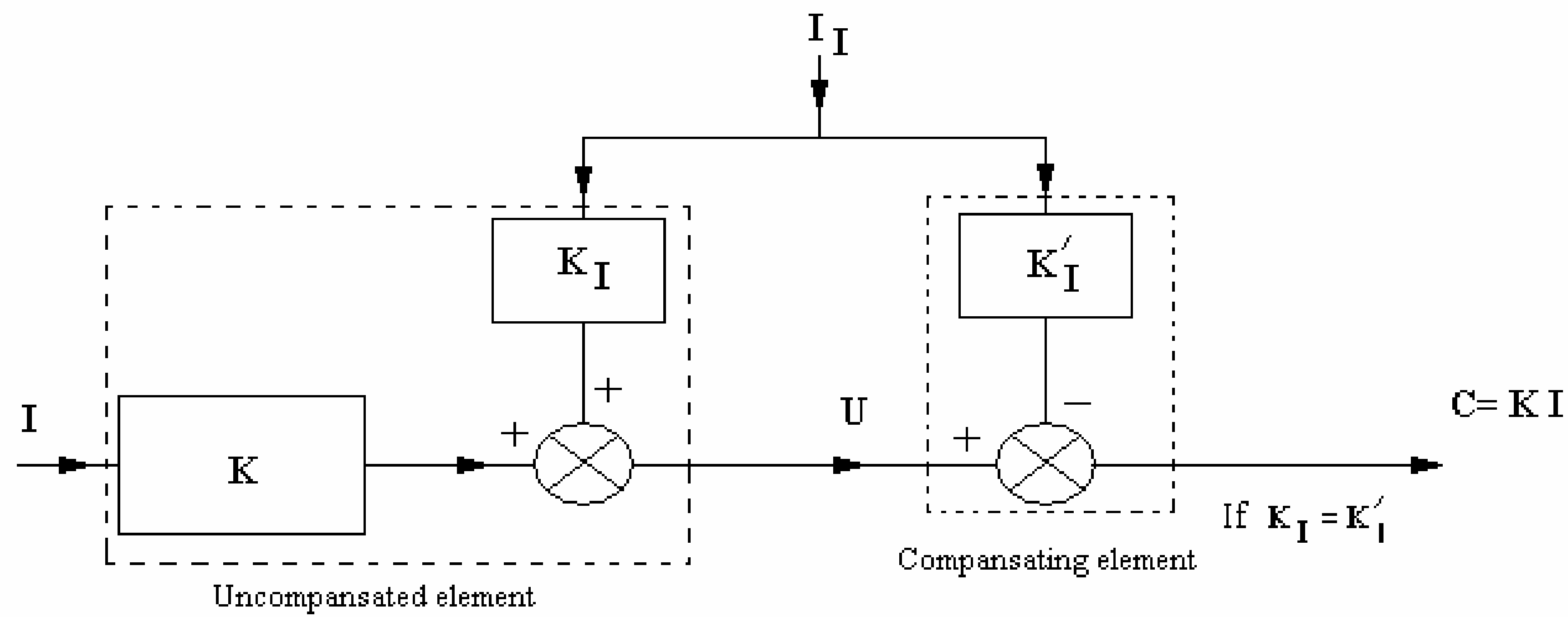
Isolation

I_I and I_M = 0

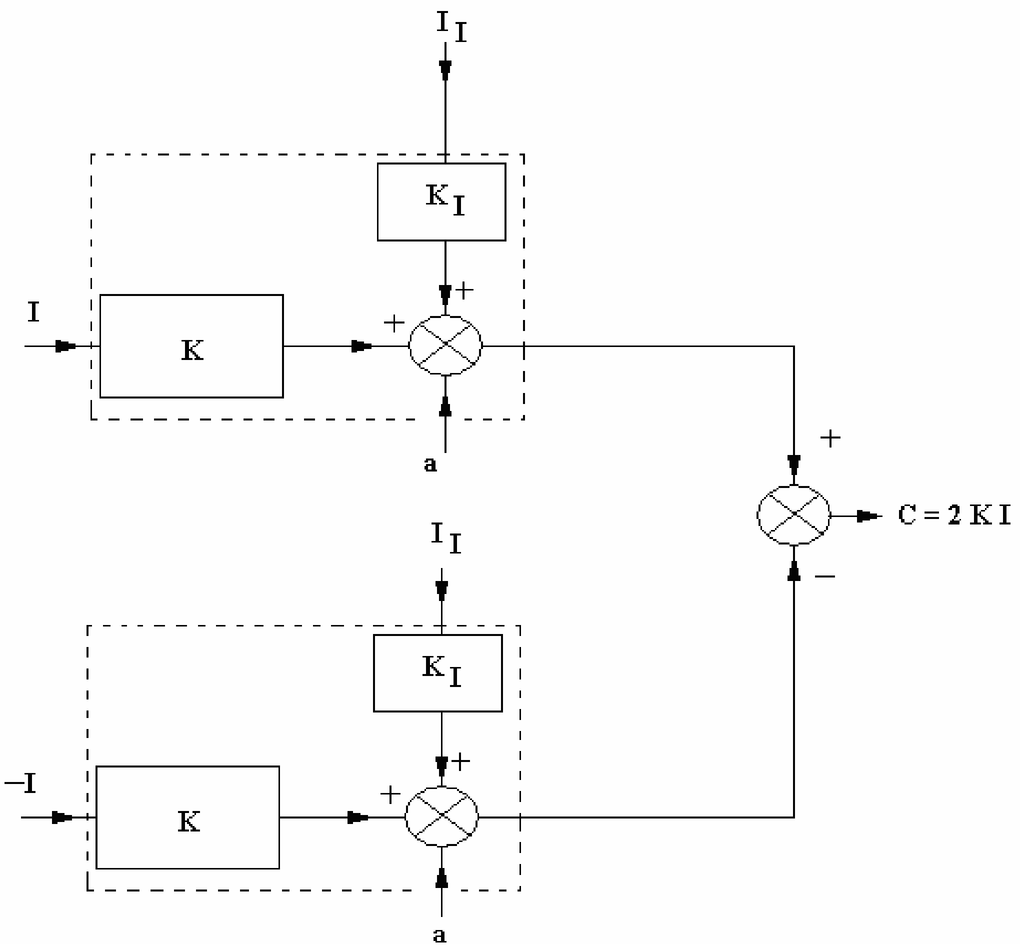
Zero Environmental Sensitivity

K_I and $K_M = 0$

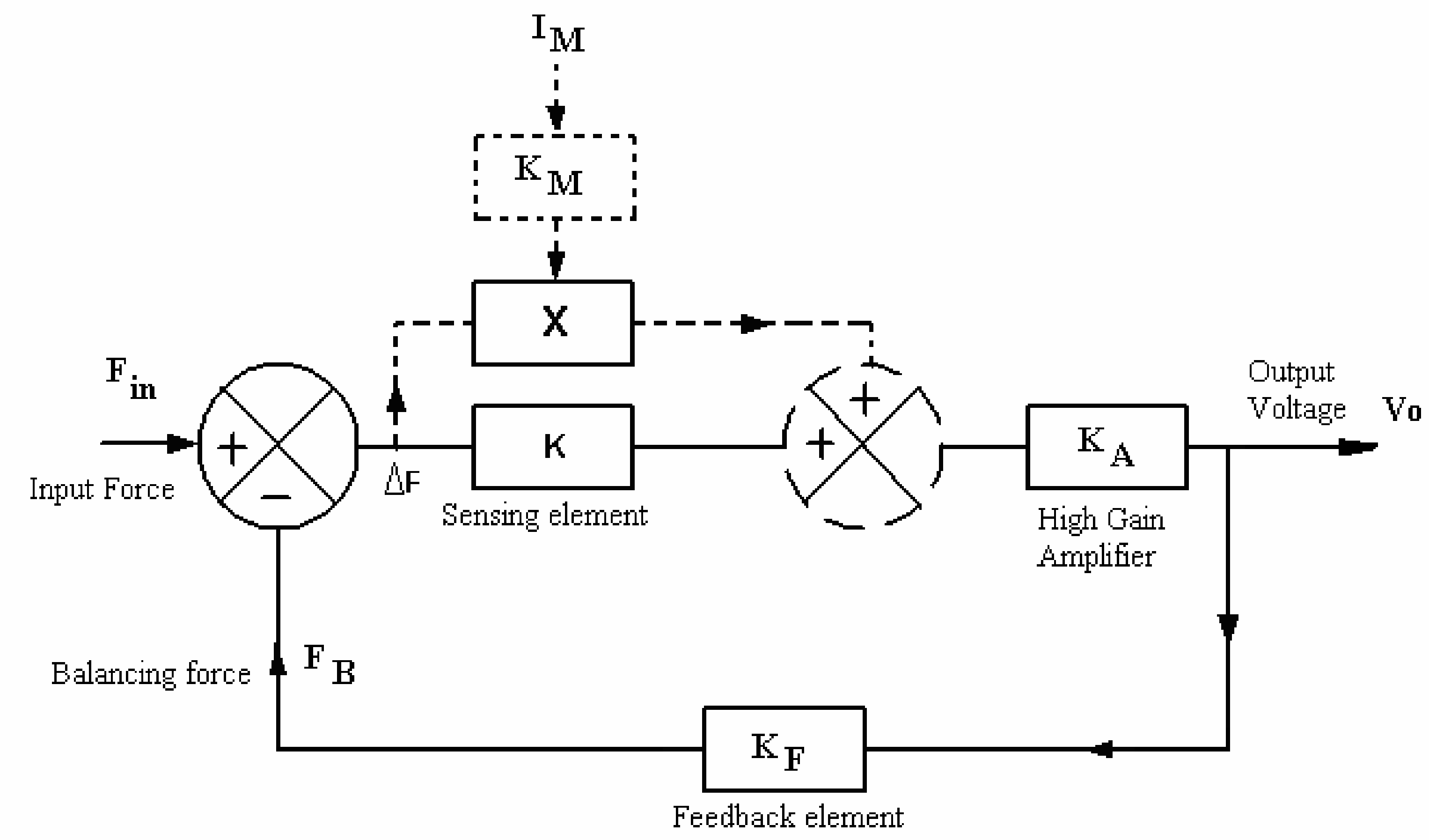
Opposite Environmental Input



Differential System



High-gain negative Feedback



Conclusion

- Methods which can only reduce the Interfering effects
  - ✓ Differential System
  - ✓ Opposing Environmental Inputs
- Methods which can only reduce the Modifiying effects
  - ✓ High-gain Negative feedback
- Methods which can reduce both Interfering and Modifiying effects
  - ✓ Companseting non-linear element
  - ✓ Isolation
  - ✓ Zero environmental sensitivity

Example2:

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.

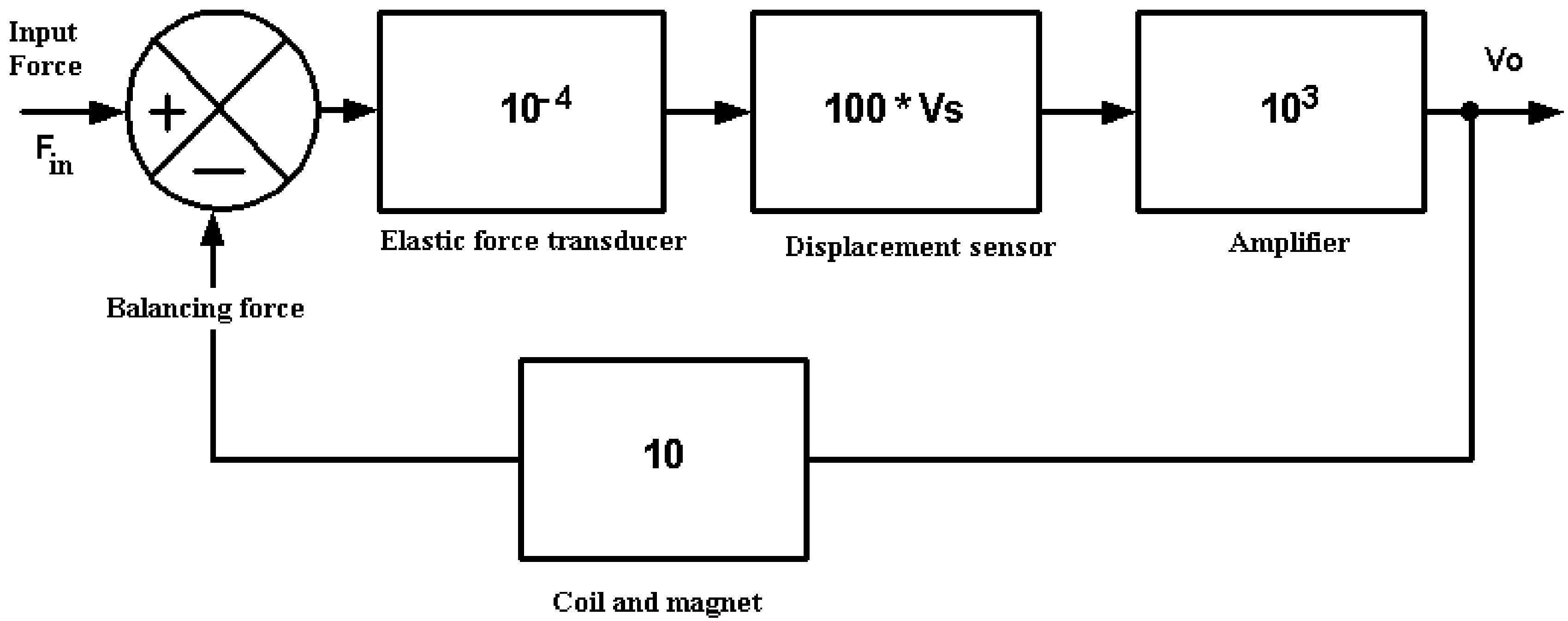
Calculate the output voltage Vo when

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



$$V_{out} = \frac{K * KA}{1 + K * KA\, KF} * F_{in}$$