EL L301

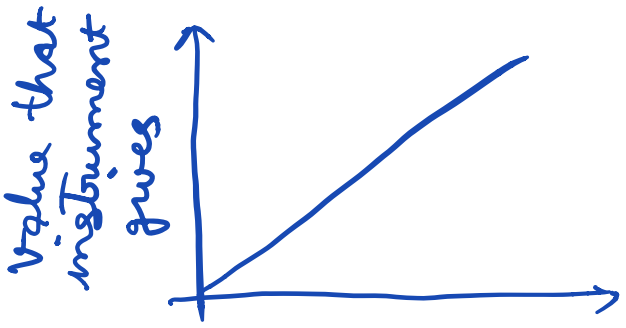
16.04.2019

Instrument Specifications

→ Range, Resolution, Accuracy, Linearity, Sensitivity } Static

Time Constant } Dynamic

• Linearity

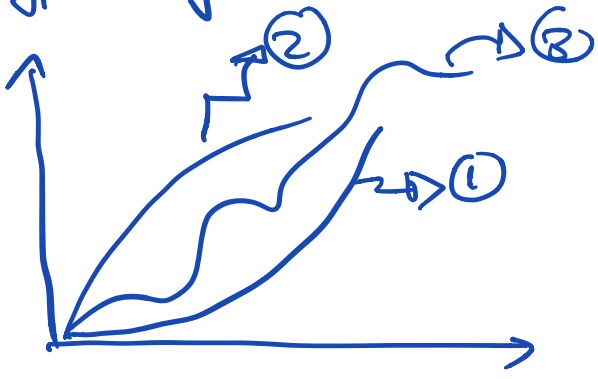


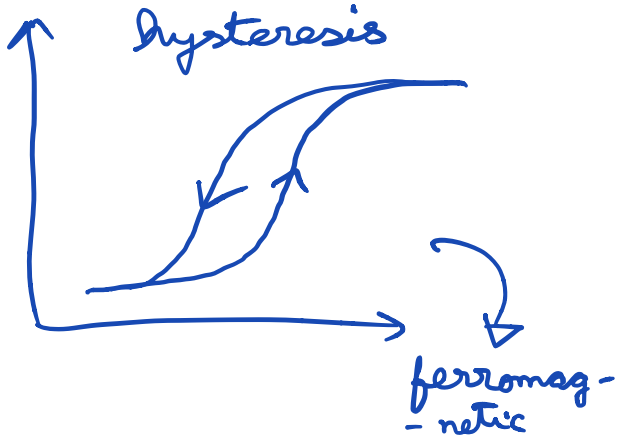
desirable, but why?

↘ simplicity?

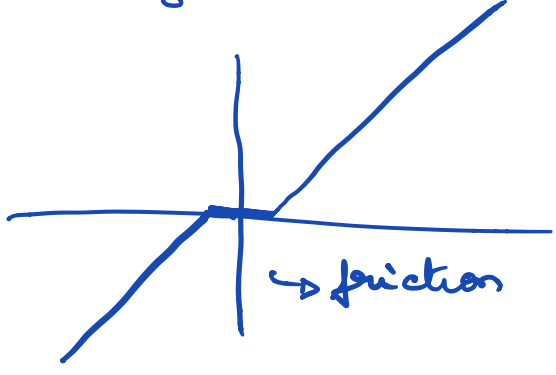
→ only one parameter

Types of nonlinearities



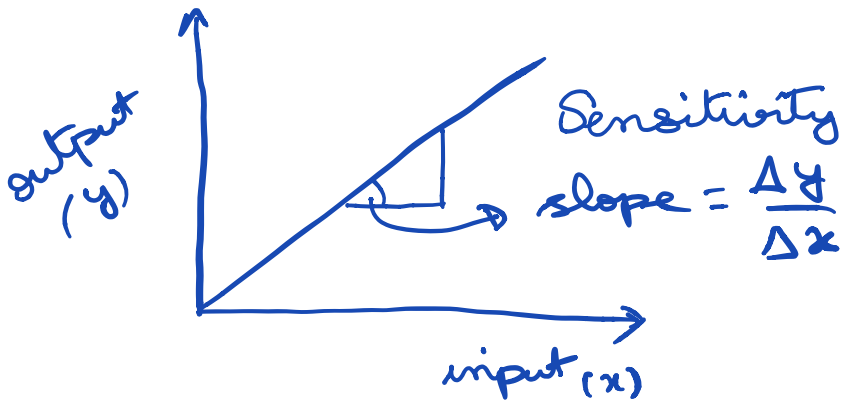


Deadzone



• Backlash?

- Sensitivity



$y = x$

$\frac{\Delta y}{\Delta x} = 1$

$\frac{\Delta y/y}{\Delta x/x} = 1$

$y = x^2$

$\frac{\Delta y}{\Delta x} = 2x$

$\frac{\Delta y/y}{\Delta x/x} = 2$

Relative sensitivity $\frac{\Delta y/y}{\Delta x/x}$

(logarithmic sensitivity) $\simeq \frac{d \ln y}{d \ln x}$

- Accuracy

This is the difference between measured value and 'true value'.

⇒ what is this?

this is the best accepted value.

→ Precision

- ⇒ related to least count.

This has to do with repeated readings of the same instrument.

If repeatable, then precise

Extent of repeatability ⇒ how precise

Can we have

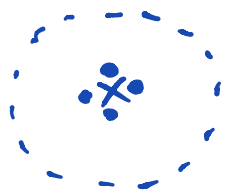
1. Accurate, Precise ✓✓

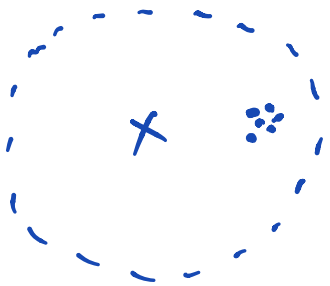
2. Accurate, NOT Precise → yes → Fig ②
   → No → Accuracy ⇒ precision

3. Not accurate, precise → yes

4. Neither accurate nor precise ✗ ✗

x: true value
•: measurements

① 

③ 

②