RawMaterials
Connecting matters

Open Your Mine
October 2019

Rock mechanics lab

WP2 Mineral resources and sustainable development

FACULDADE DE CIÊNCIAS E TECNOLOGIA
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30.10.2019
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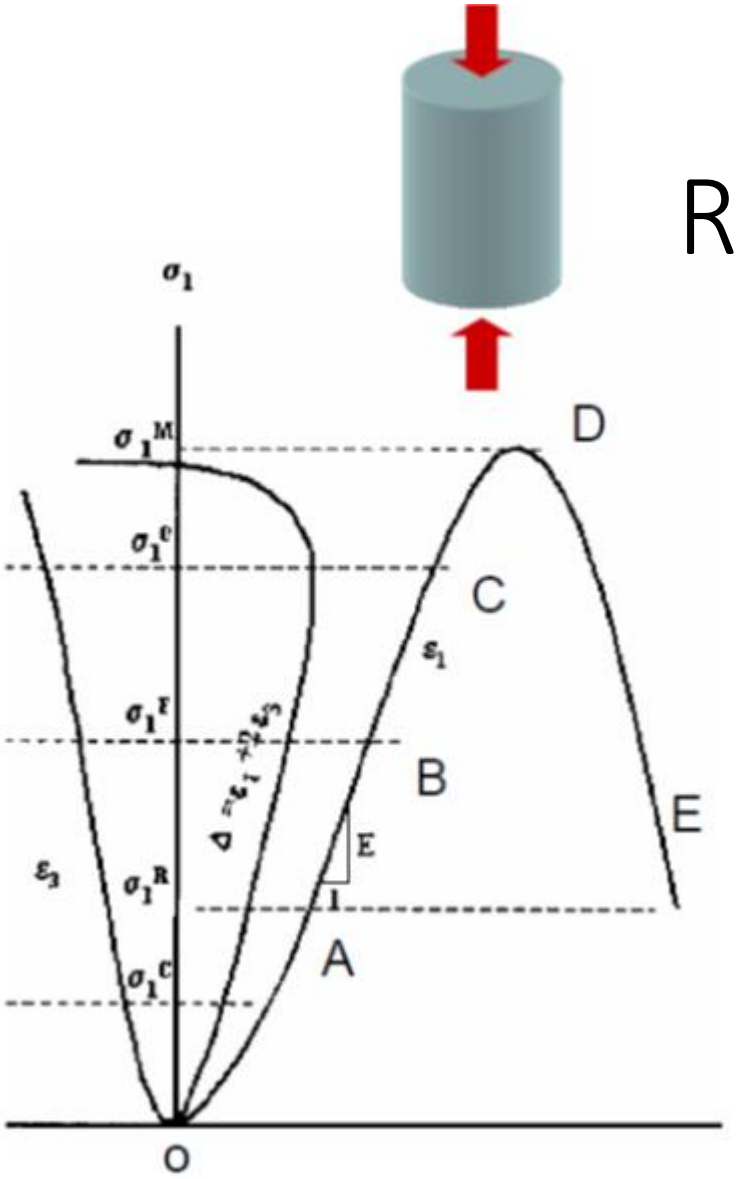
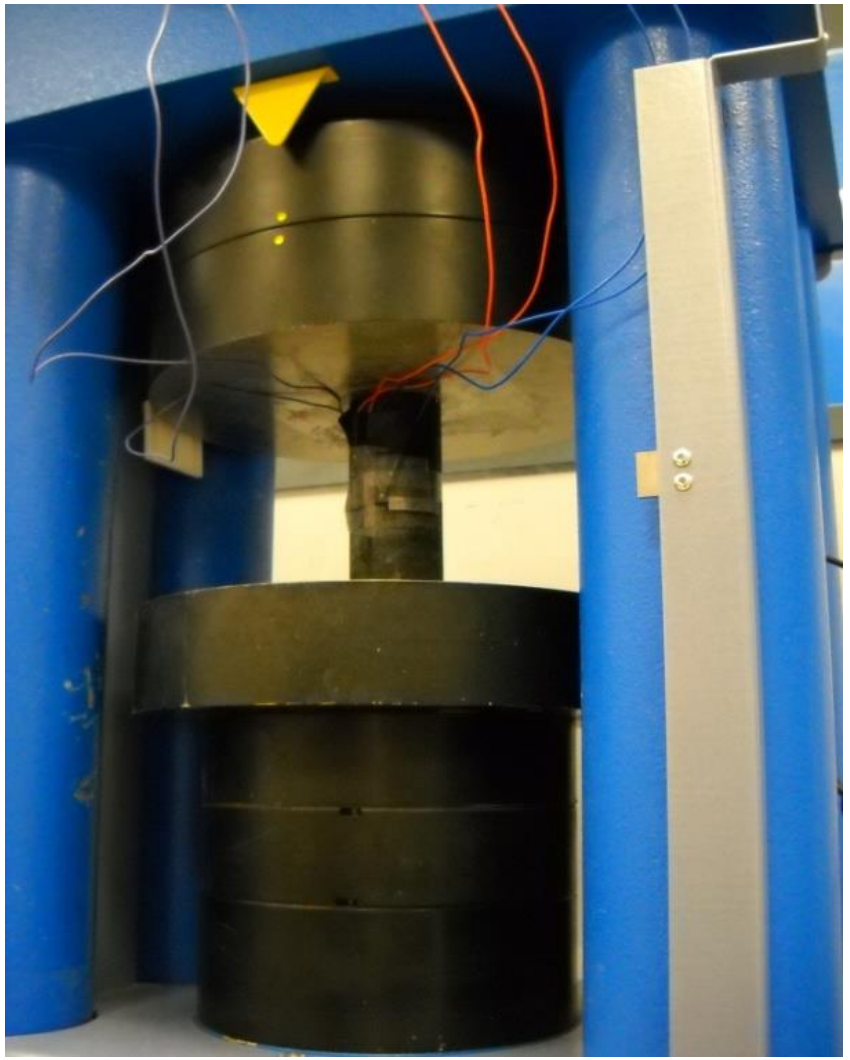
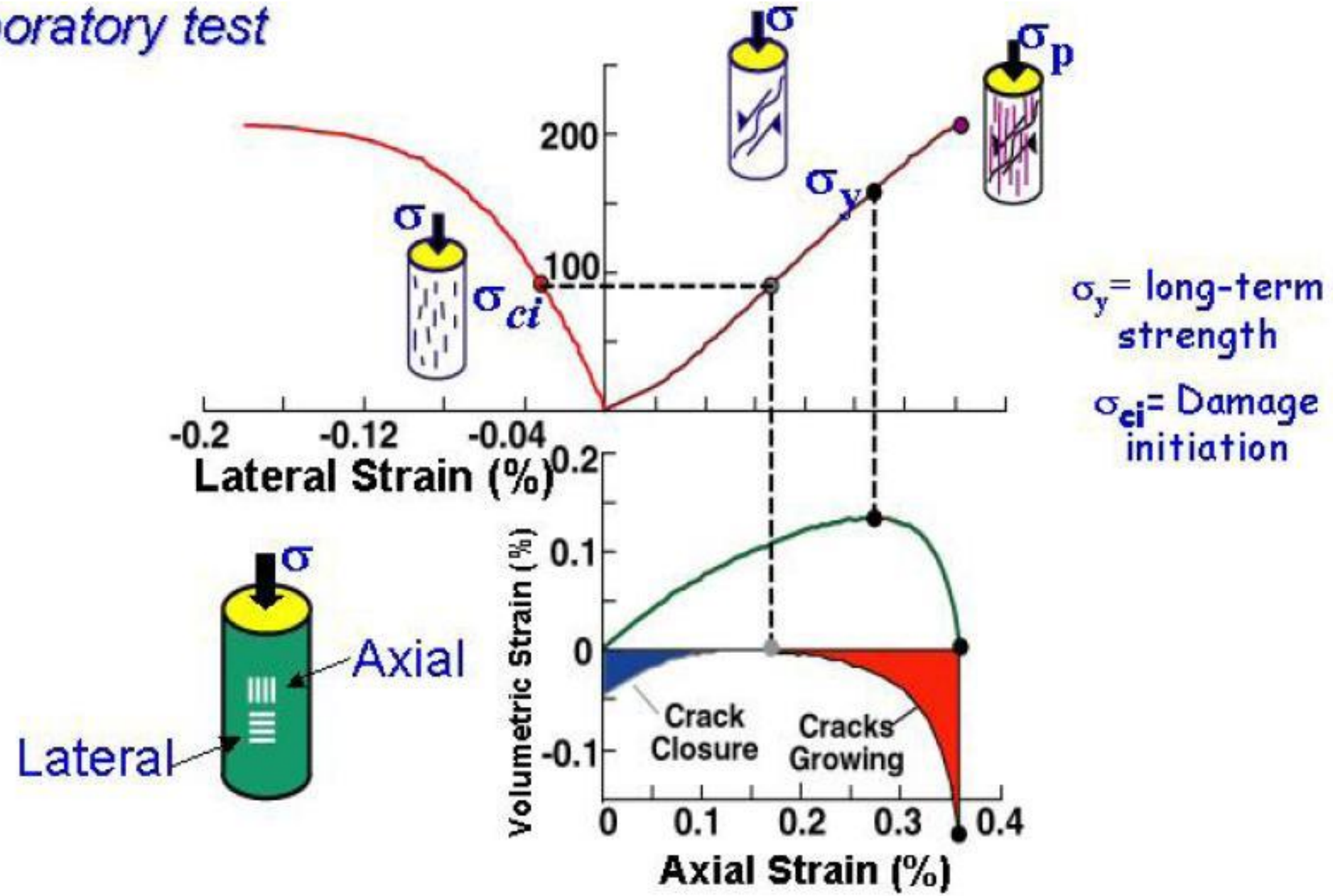
Rock strength





Laboratory test



What should be evaluated:

Axial strain = ε_a = average axial deformation / specimen length

Lateral strain = ε_l = average lateral deformation / specimen diameter

Volumetric strain = **Axial strain** + 2 * **Lateral strain**

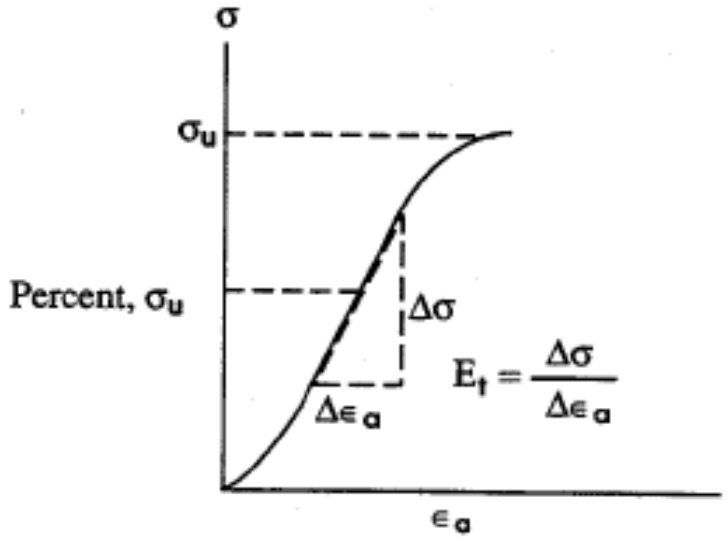
Axial elastic modulus = Ea = $(\text{Strength}_2\text{-Strength}_1)/(\varepsilon_{a\,2} - \varepsilon_{a1})$

Lateral elastic modulus = El = $(\text{Strength}_2\text{-Strength}_1)/(\varepsilon_{l\,2} - \varepsilon_{l1})$

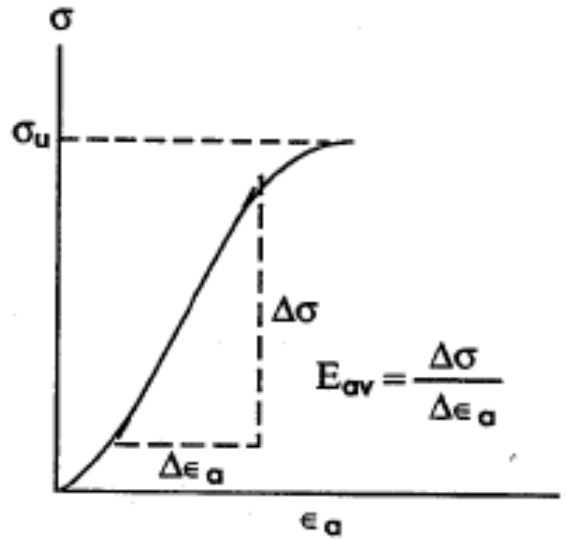
dilation = $-\,\varepsilon_l / \varepsilon_a$

Elastic behaviour: **Poisson coeficient** = ν = El/Ea

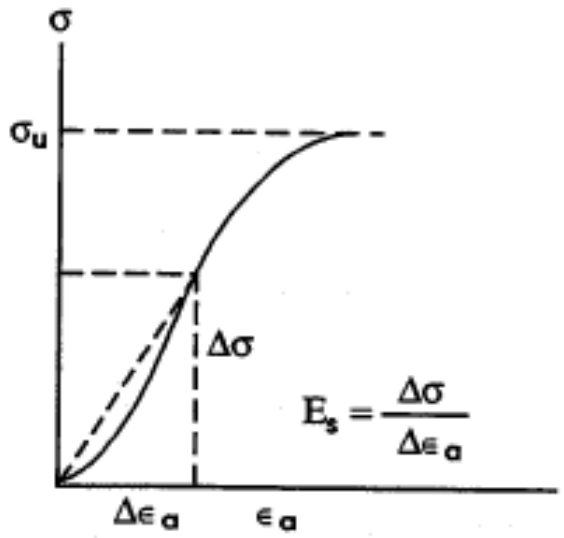
Elastic modulus



(a) Tangent Modulus Measured at a Fixed Percentage of Ultimate Strength



(b) Average Modulus of Linear Portion of Axial Stress-Strain Curve

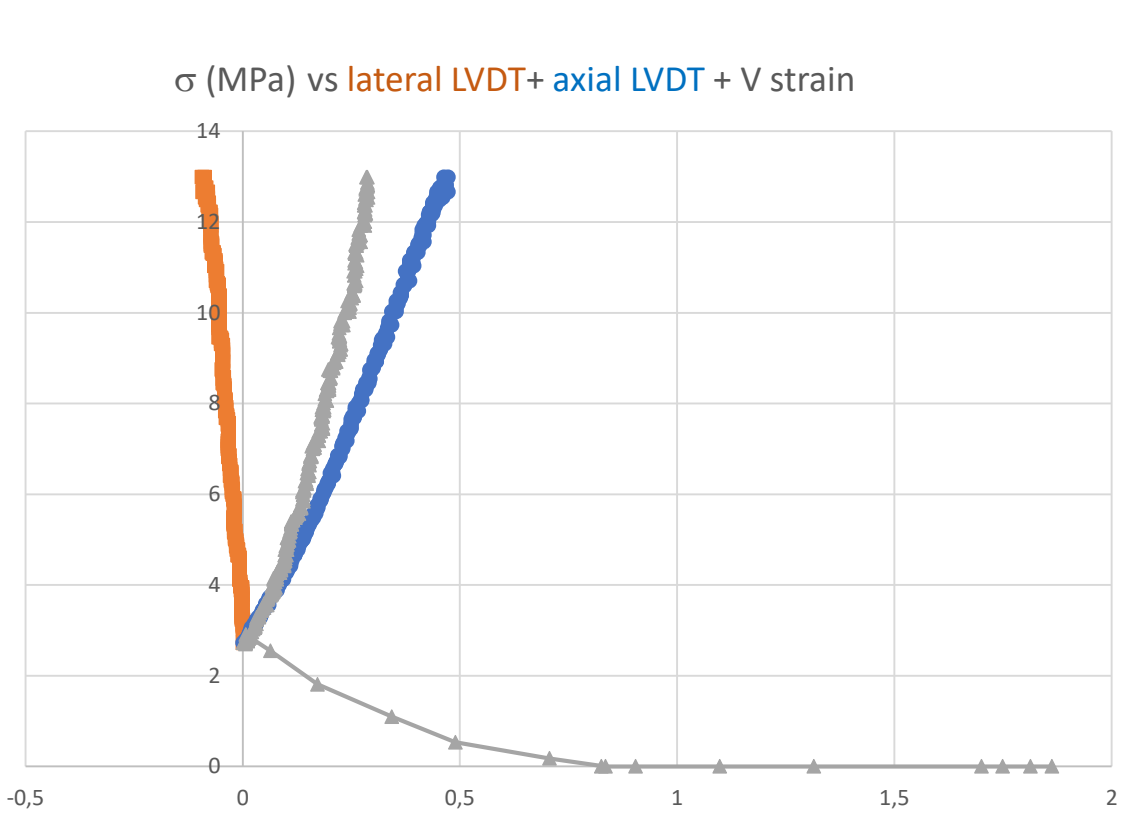


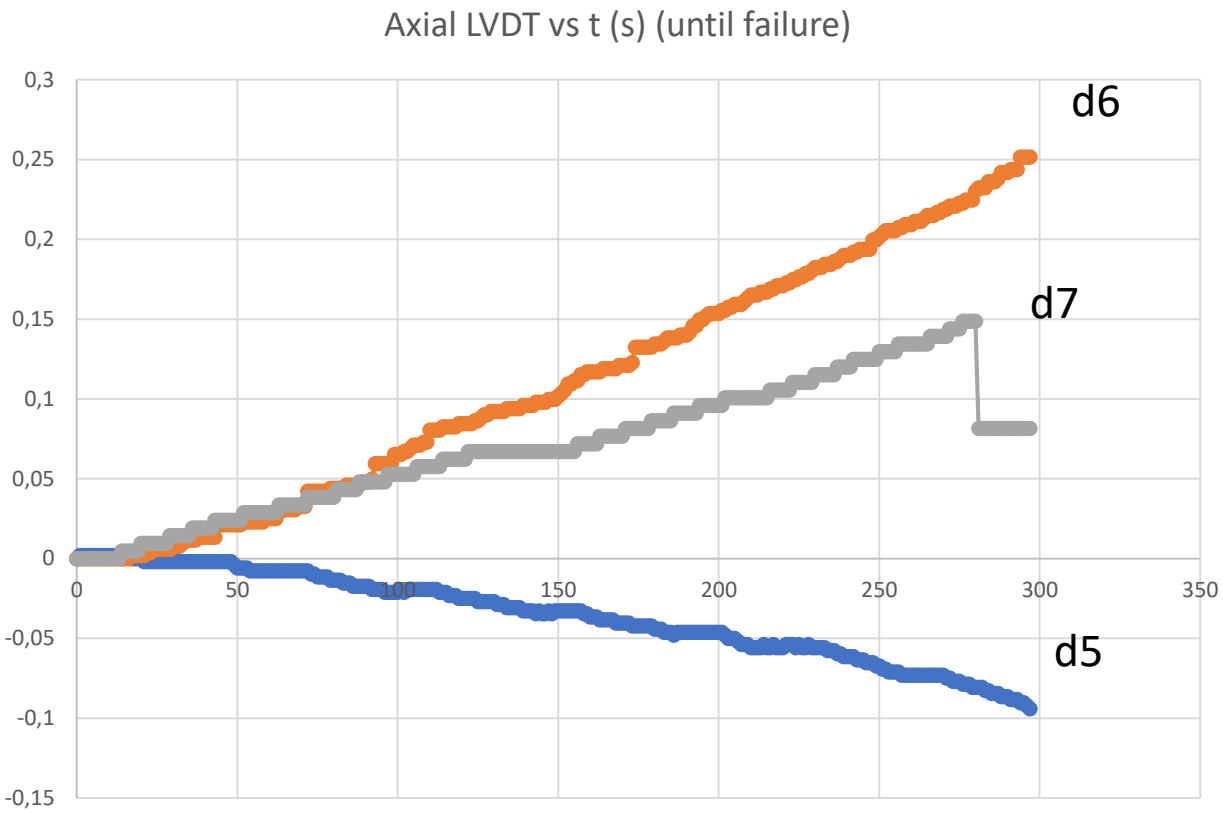
(c) Secant Modulus Measured up to a Fixed Percentage of Ultimate Strength

Uniaxial Compression test using LVDT to measure deformations

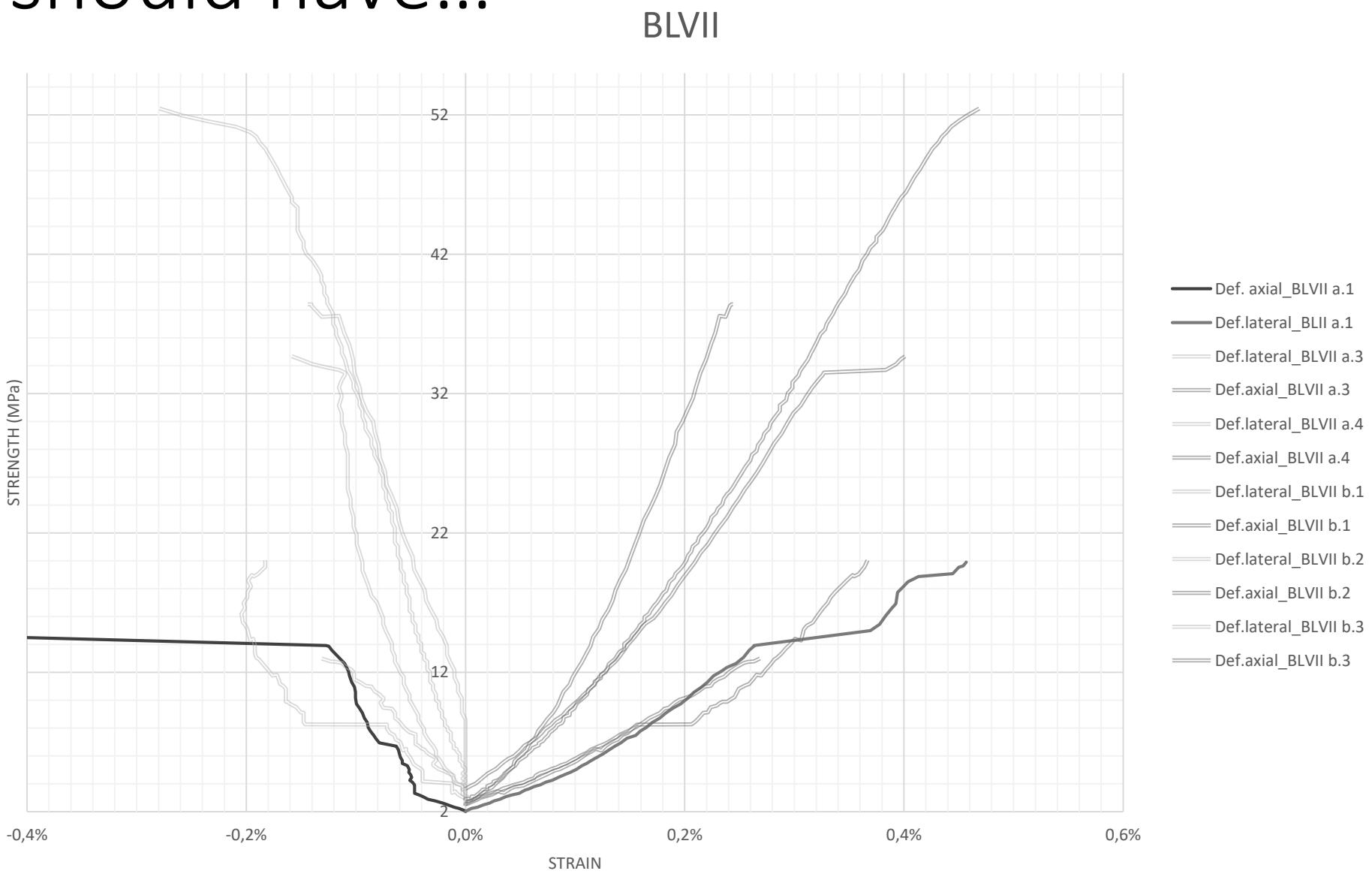
- 4 LVDTs to measure axial displacements (d1 to d4)
- 3 LVDTs to measure lateral displacements (d5 to d7)

What you may get…

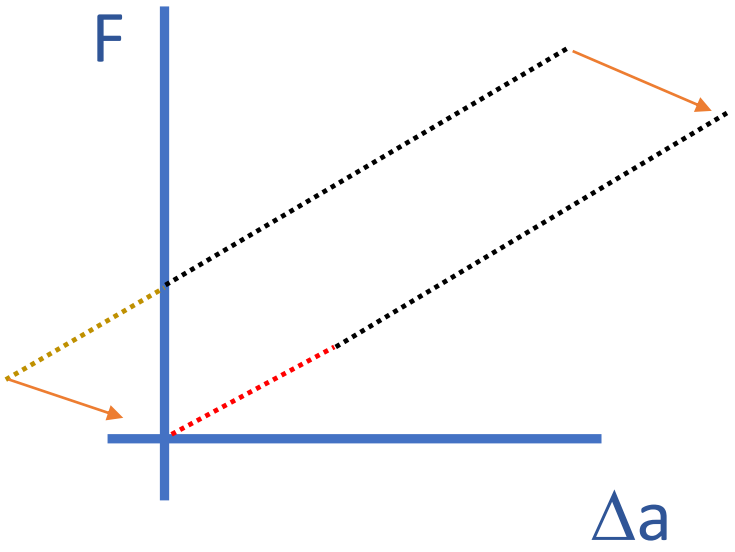




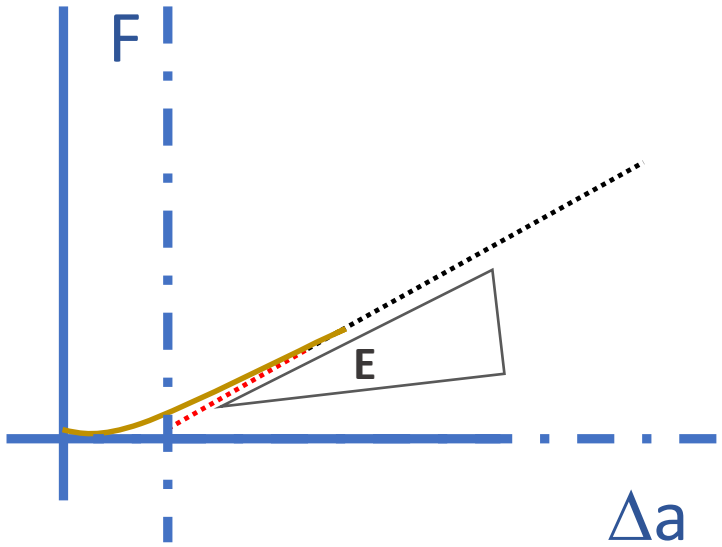
What you should have…



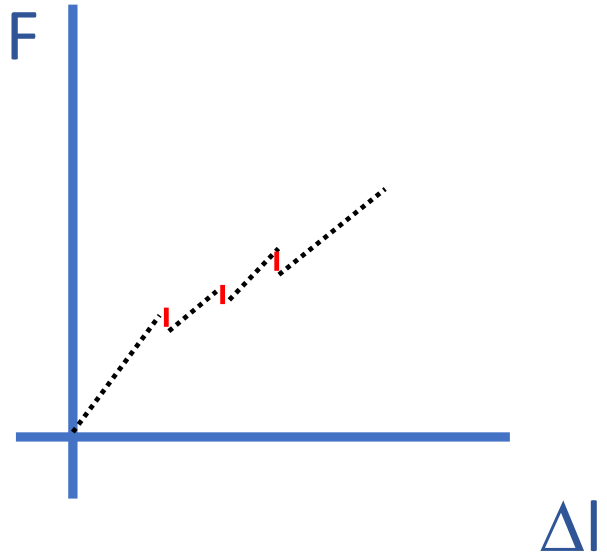
Corrections…



LVDT value for each *t(s)* minus *LVDT value* when *Force=0*

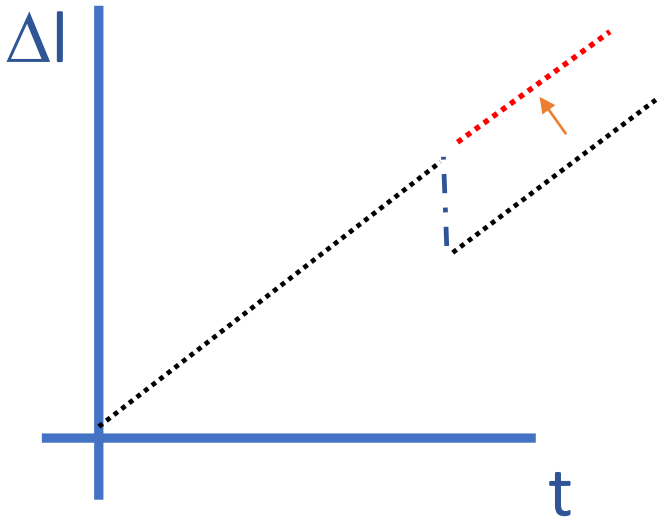


Machine' plate adaptation to the specimen

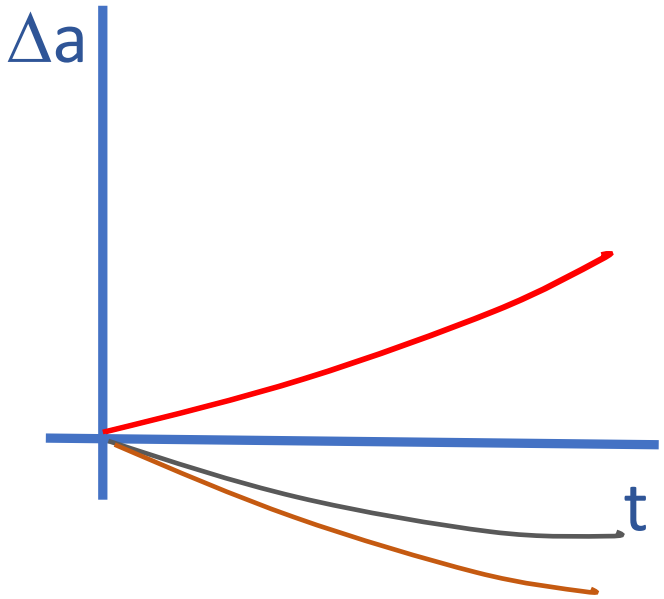


Steps are due to changes in F ⇒ local failure / top and bottom of specimen are not flat and parallel/fissures inside specimen

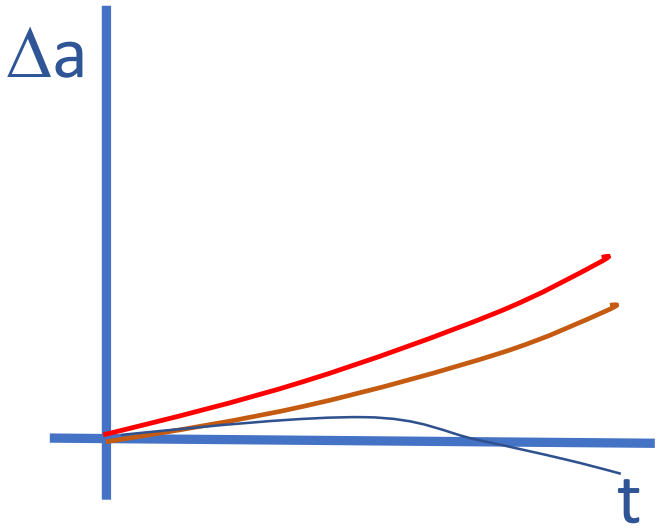
Corrections…



LVDT ‘dives’ suddenly but the slope is same ⇒ *LVDT* adaptation to the specimen surface



LVDTs have + / – signals from the begining and maintain it



LVDTs have same signals at the beginning and then chance ⇒ usualy is due to the test and use it for the average

Let´s work real data…

- Excel file *BLVII_UCS_b3*