

Experimental Testing for Aerospace Structures

Laboratory Activity n° 2

November 07th — 11th, 2022

Name

Surname

A “*rosette*” measuring system, with strain gauges in the 0° ; $+45^\circ$; -45° configuration, is bonded to a structural component of the wing structure, designed and manufactured by Aeronautical Master course students within the “*ACADEME*” project (year 2017-2018 and revised in 2018-2019), see Fig. 1. Such a wing section could be roughly considered as a bi-dimensional structure properly supported at the wing ends. Each strain gauge is connected to the Micro-Measurement P-3 acquisition system in the “1/4”-bridge configuration. With reference to the given strain gauge data sheet, it is requested to estimate the:

1. 3 components of the strain field - evaluated at the “*rosette*” bonding location and in the strain gage “natural” directions - as a result of the application of the given lumped mass in the prescribed location of the structure. For this purpose a minimum number of 10 strain measurements for each direction is required.
2. principal strains and directions with respect to the reference frame formed by the wing span and chord directions. These estimates should be carried out using both the approach that maximizes the strain as a function of the orientation angle, and the one that solves the eigen-problem associated to the strain tensor.
3. amplification factor for the applied load to reach the margin of safety of 1.5.

Finally, it is requested to experimentally validate the shear strain estimate, in the given reference frame, by properly connecting the available strain gauges in the “1/2 – bridge” configuration.

Write a report, saved in pdf format and named as “*L2_GX_FAMILYNAME.pdf*” (being *X* the laboratory group number), detailing the experimental/numerical activities carried out and discussing the achieved results.

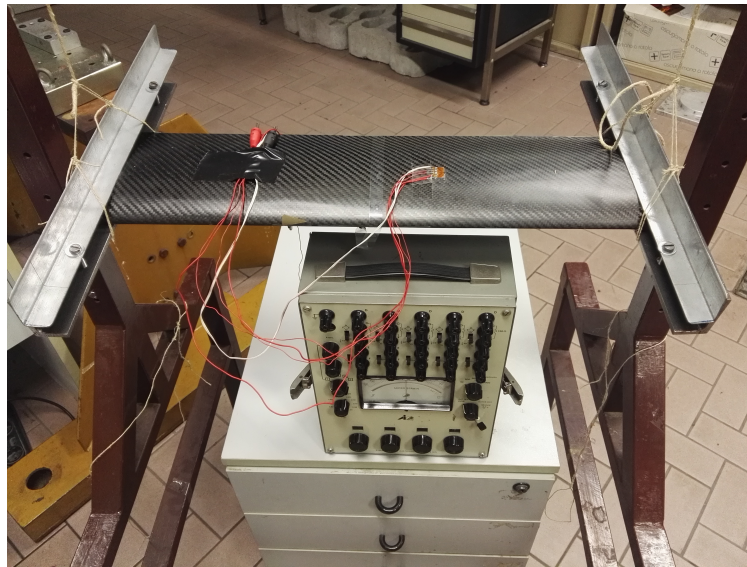


Figure 1: Overview of the strain gauge measuring chain for “ACADEME” wing structure.