- Project proposal -
Microscopic observation and statistical analysis of initiation and propagation of the fiber/matrix interface crack

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1. Introduction

Only few works ([1, 2]) have attempted to quantify the size of debonding

2. Objectives

1. Determine the statistical distribution and statitstical descriptors (mean, mode, median, variance) of

    a debond size,

    b angular position of debond's crack tips,

    c angular position of debond's mid-point,

    d angular position of kinks' start,

    e kinking angles,

parameterized with respect to

    a fibers' material,

    b laminate lay-up,

    c level of applied strain.

2. Investigate correlations between the quantities defined in and the distribution of

a fibers' radii

b angular position of closest fiber to debonded one

c distance of closest fiber to debonded one

d material

e lay-up

f level of applied strain

3. Materials

Glass-fiber and carbon-fiber cross-ply $[0^{\circ}_{m\cdot n}, 90^{\circ}_n]$ with $m = 1, 10$. 6 specimens for each lay-up and material combination, for a total of 24.

4. Methods

5. Expected outcomes

6. Audience

1-2 students for Project Course or Master thesis.

References

[1] E. Correa, M. I. Valverde, M. L. Velasco, F. París, Microscopical observations of inter-fibre failure under tension, Composites Science and Technology 155 (2018) 213–220. doi:10.1016/j.compscitech.2017.12.009.

[2] P. L. Zumaquero, E. Correa, J. Justo, F. París, Microscopical observations of interface cracks from inter-fibre failure under compression in composite laminates, Composites Part A: Applied Science and Manufacturing 110 (2018) 76–83. doi:10.1016/j.compositesa.2018.04.004.