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Thèse CIFRE, 2018 – 2021
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Etude du comportement biaxial des matériaux tissés : application à la traction de navires par kite

Study of biaxial behavior of woven fabrics: application to boat kite-tractor

Context



Giant kite for boat traction :
New application for textile materials with high performances

Problem : No material selection criteria for kite design

Beyond The Sea project – Yves Parlier

Material :

Coated woven fabrics

Defining criterion involve :

- Behavior of the structure

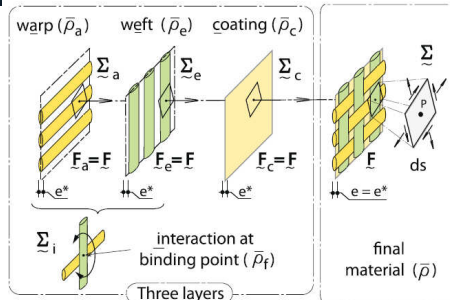
Anisotropy (fill, warp)

- Load capacity

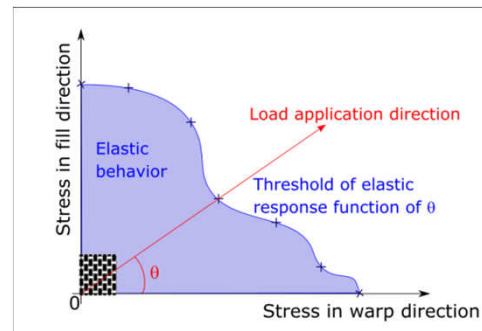
Elastic limit definition

- Environment

UV-Water-Salt



Dib 2017 – Int. J. of Solids and Structures



Method

Experimental work on coated woven fabric material and theoretical work on mechanical criterion

Step 1 :

Study of uni-axial behavior

Tests on selected materials in three directions:

- Fill direction
- Warp direction
- Bias direction



Uniaxial test bench-IRDIL

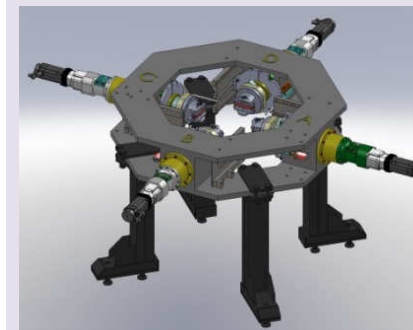
Step 2 :

Study of biaxial behavior

Sample and test design

- shape of specimen
- machine jaw

Definition and validation of an elastic limit criterion using biaxial tests



Biaxial test bench-3SR

Step 3 :

Study of environment factors

Test of ageing specimen

- UV ageing
- Water exposure
- Mechanical stress

Definition and validation of general criterion for material design

Selection of suitable material for giant kite design



Spinnaker sail – Porcher-industries