

Effect of structural imperfections in mechanical response of woven composites

Juan José Espadas Escalante

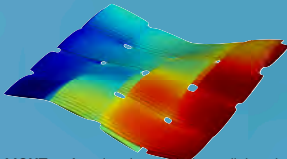
Applied mechanics
Uppsala University

Lighter Ph.D. network conference

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Outline

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- 1 Background and motivation
- 2 Research
- 3 Agenda goals

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Overview: The large context

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- Failure mechanisms are not fully understood
- In general, it is hard to predict failure
- The bridges between scales are not always clear
- Woven laminate damage onset differs from U-D laminates



Lug failure from A300 Airbus tail (2001)

1 Background and motivation

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3 Agenda goals

General objective

Study the role of structural imperfections and their consequences the mechanical behavior of woven composite laminates

Specific objectives

- To establish differences between scales when performing computational homogenization
- To include structural imperfections and study effects that could promote damage
- To model the damage process including such imperfections
- To investigate experimentally damage processes including imperfections

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Composite Structures

journal homepage: www.elsevier.com/locate/compstruct


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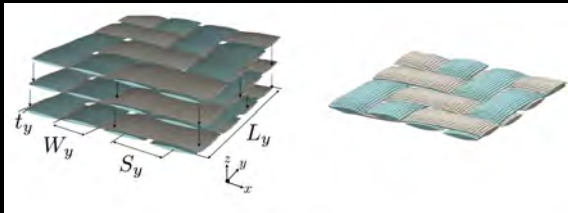
COMPOSITE STRUCTURES

A study on the influence of boundary conditions in computational homogenization of periodic structures with application to woven composites

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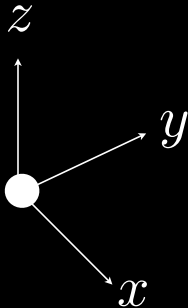
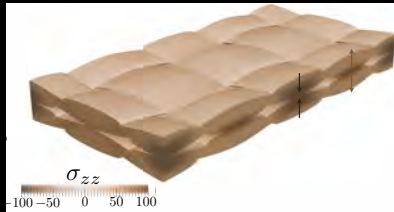


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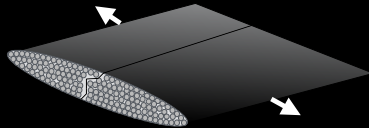


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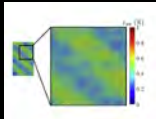
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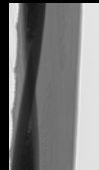
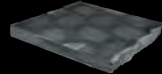
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Specific questions

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The goals of my research on short term (ST) and long term (LT) and contributions that will give towards the LIGHTer agenda (C)

- Better understanding of damage mechanisms in woven composites (ST)
- Find better ways to model computationally-efficient damage mechanisms involved in the meso-scale in large models (LT)
- Serve as a feed back for product design (C)

Specific questions

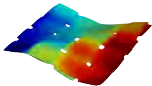
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How can my research contribute to academic and industrial goals according to the LIGHTer agenda in the long term, i.e. for 2033?

A. A better understanding of the damage processes will contribute to avoid the use of over-conservative models and cost-ineffective design of composite materials, this will impact in LIGHTer goals. Specially in **Lower costs for light weight structures.**

Thank You!

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