

bmcs course

brittle/matrix cementitious
composite structures

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*orocrete: Yoshimura vault, RWTH Aachen
(2015)*

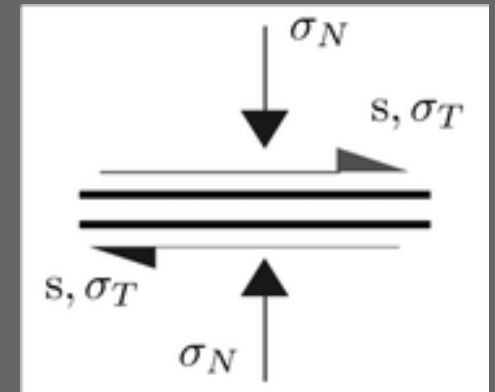
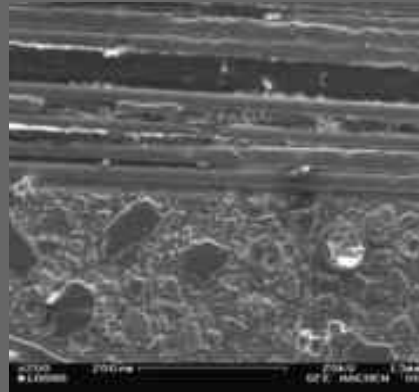
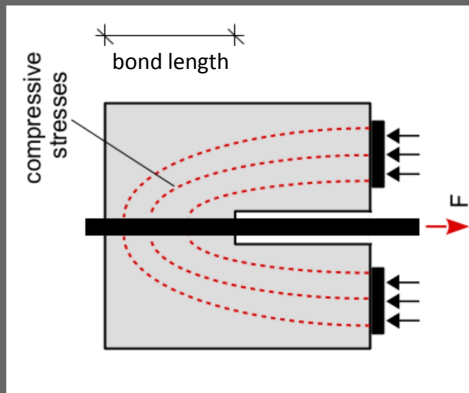


*Jena, Germany, Dyckerhoff-Widmann
(1922-1923)*

... what is this course about ...

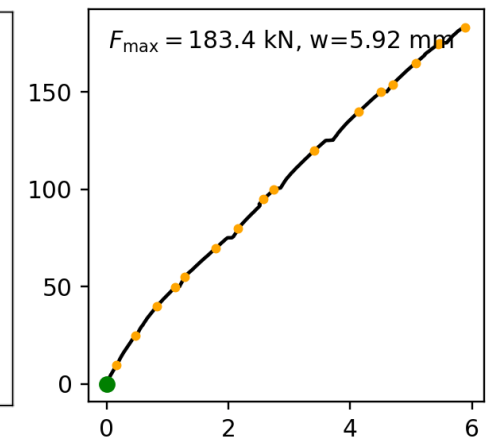
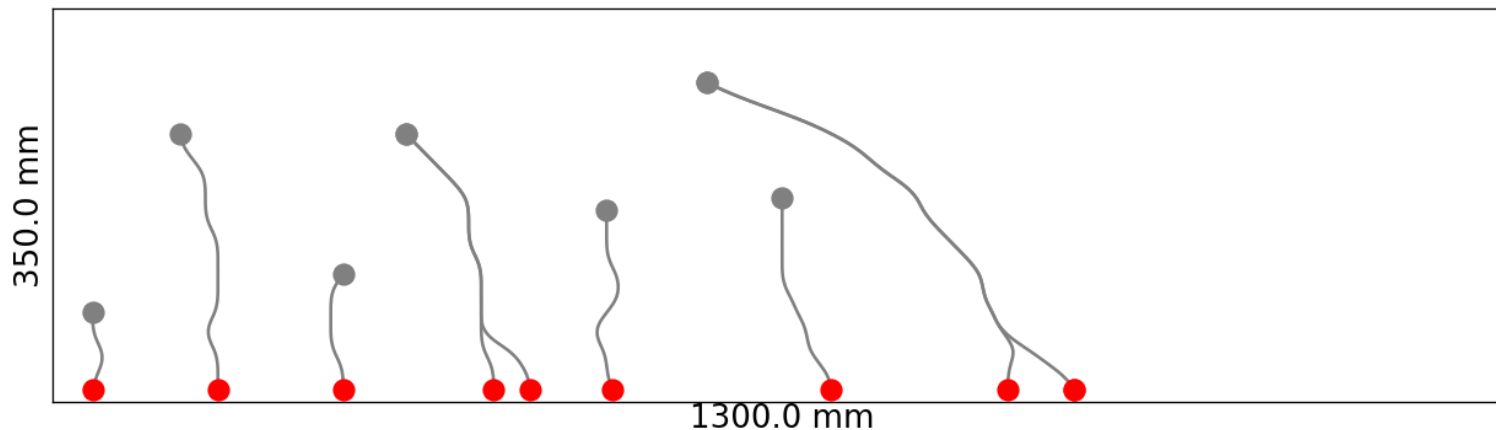
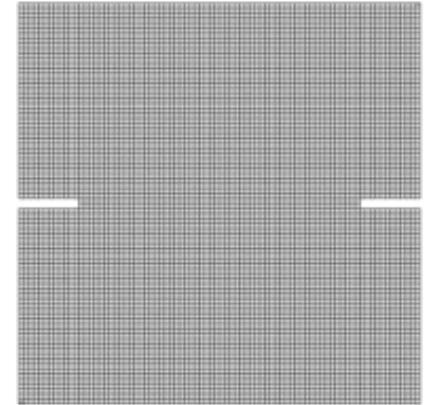
Bond - the ideal lab for learning the material modeling

- how to measure and characterize the bond behavior?
- what happens in the interface during debonding?
- how to model the debonding process?
- what happens if we change geometry or cross section?



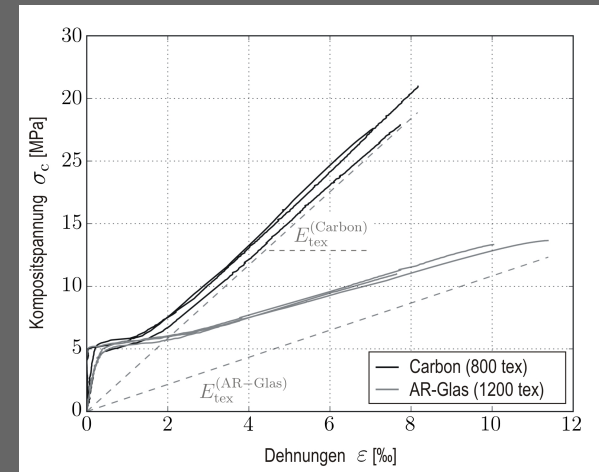
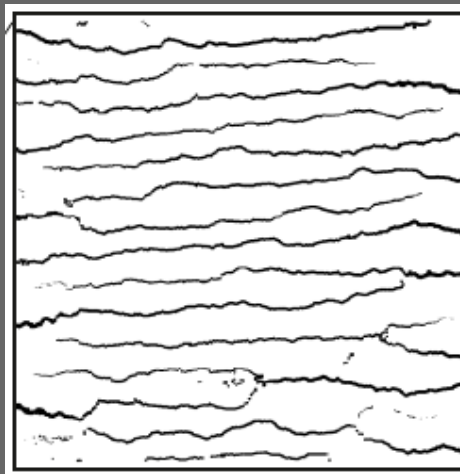
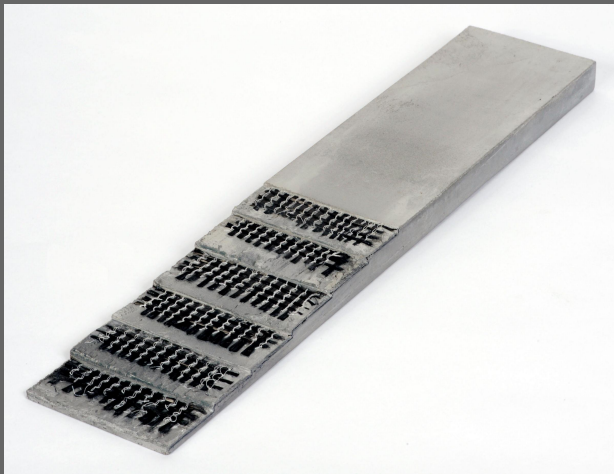
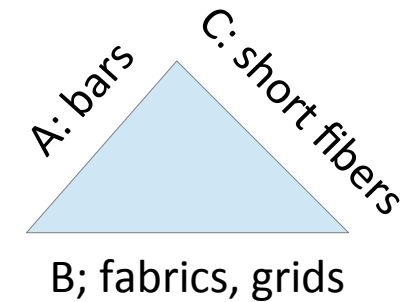
Cracking → brittle material behavior

- can cracks be useful?
- how do they emerge and propagate?
- how to model them?
- how to detect and observe them?



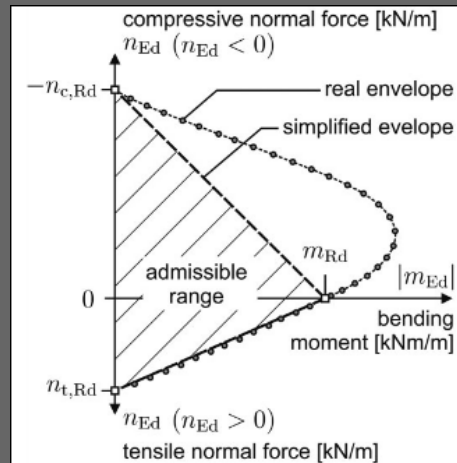
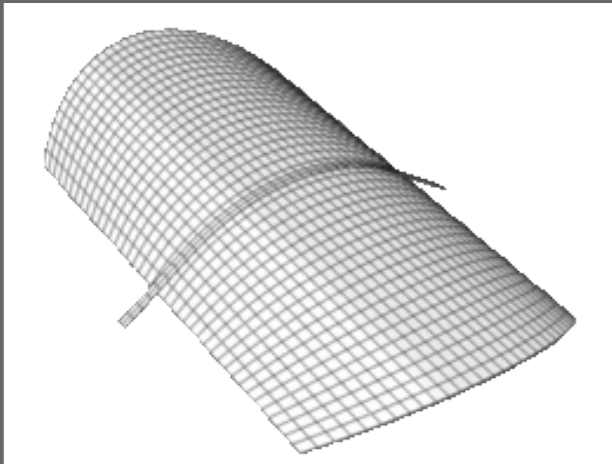
Composite – combine the advantages of two or more materials

- interplay of cracking / debonding ?
- how does it affect the material behavior?
- how to test / model / characterize it?
- how to design a high performance material?



Brittle-matrix composite structures

- structural behavior ?
- design & assessment methods ?
- applications & development potential ?



FROM ANALYSIS TO DESIGN

Change in paradigms of structural design



How to manage the complexity?

METHODS?

How to manage the complexity?

ELEMENTARY → COMPLEX

LOCAL → GLOBAL

GENERAL → SPECIAL

ABSTRACT → CONCRETE

IDEALIZATION → MODEL → CALIBRATION → VALIDATION

MECHANISMS



GENERAL

EL elastic

DB debonding / friction

DC decohesion

ELEMENTARY CONFIGURATIONS

M

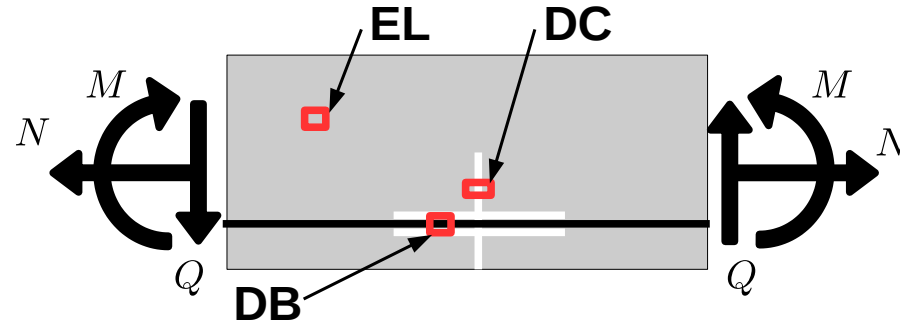
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STRUCTURES

MECHANISMS

ELEMENTARY CONFIGURATIONS

STRUCTURES



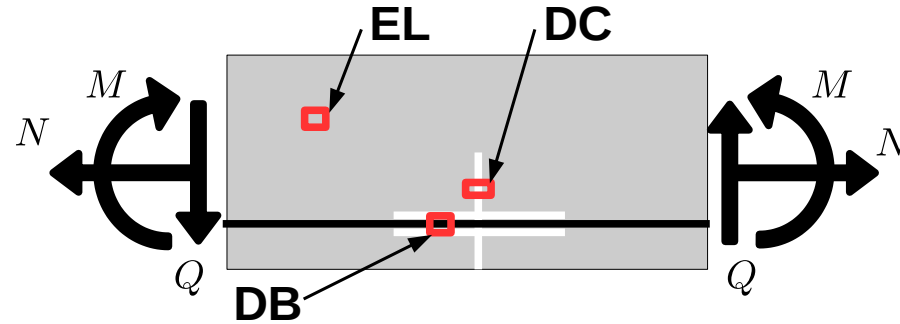
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MECHANISMS



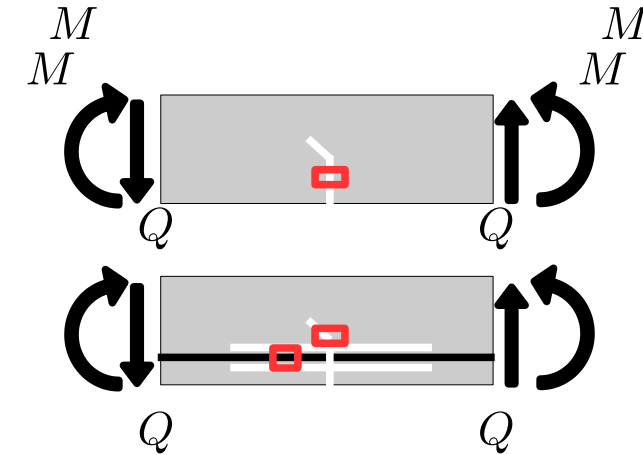
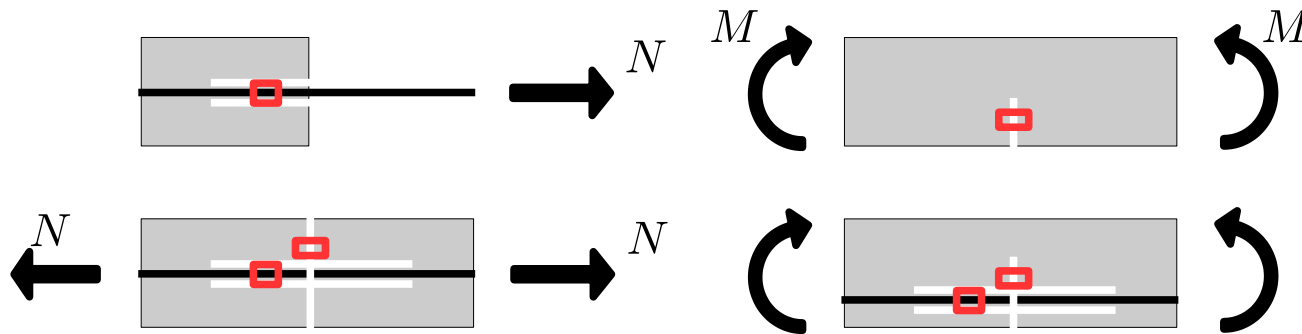
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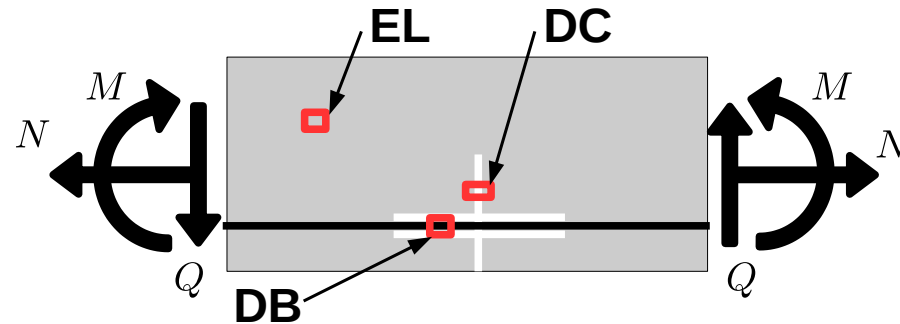
DC decohesion

ELEMENTARY CONFIGURATIONS



STRUCTURES

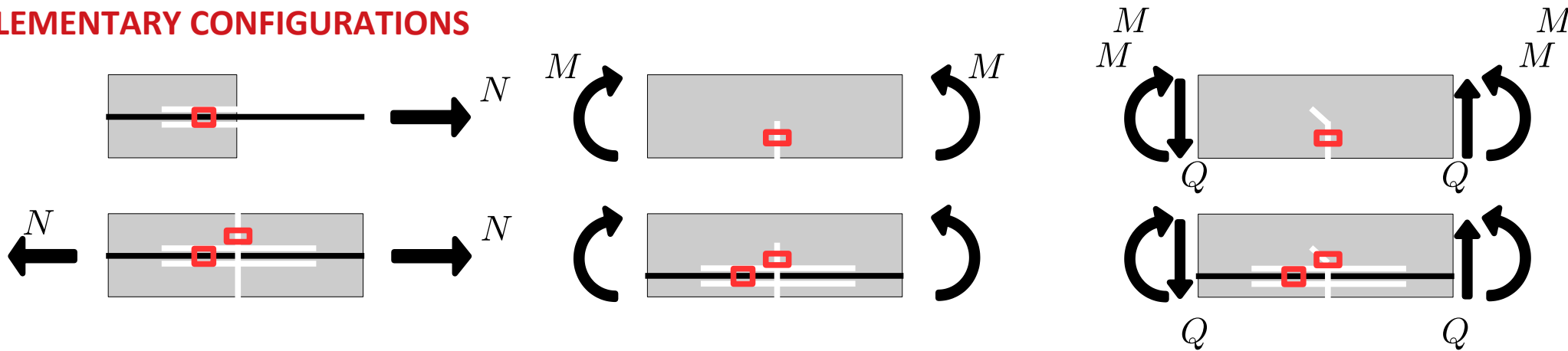
MECHANISMS



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ELEMENTARY CONFIGURATIONS



STRUCTURES

