

The response of growth ring in wood to microclimate change

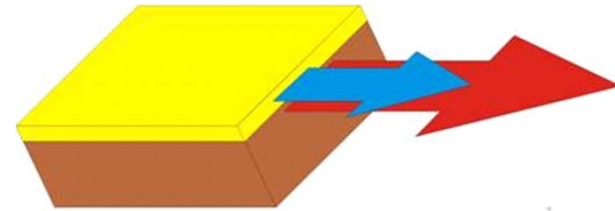


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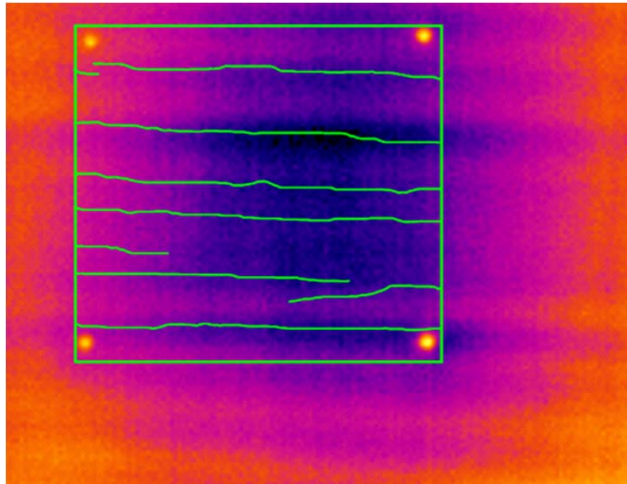
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Damage mechanism of panel paintings

The difference in the metric response of the decorative layer and wooden support to humidity variations is one of the mechanisms responsible for the panel paintings damage. Repeated cycles of environmentally induced stress lead to cracking of the design layer.



Fatigue tests of fake painting



- In order to speed up the damage process we mimic the humidity cycles by stretching a sample in a universal testing machine. The resulted crack pattern is correlated with the positions of the panel growth rings.

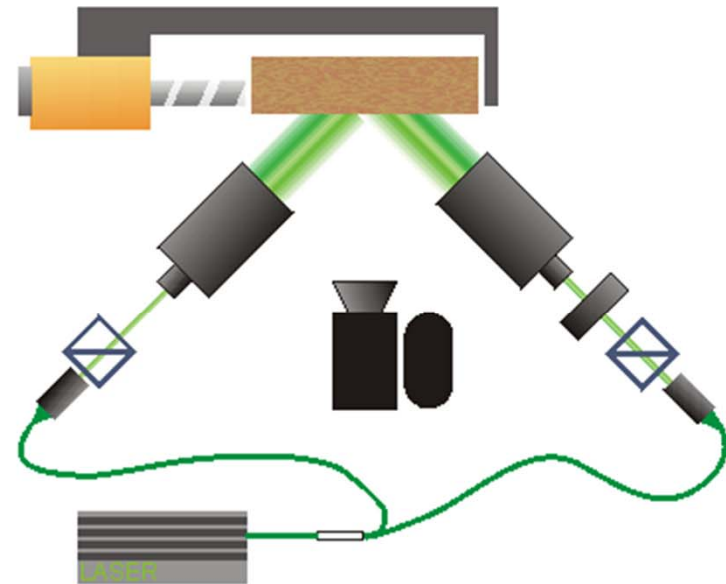
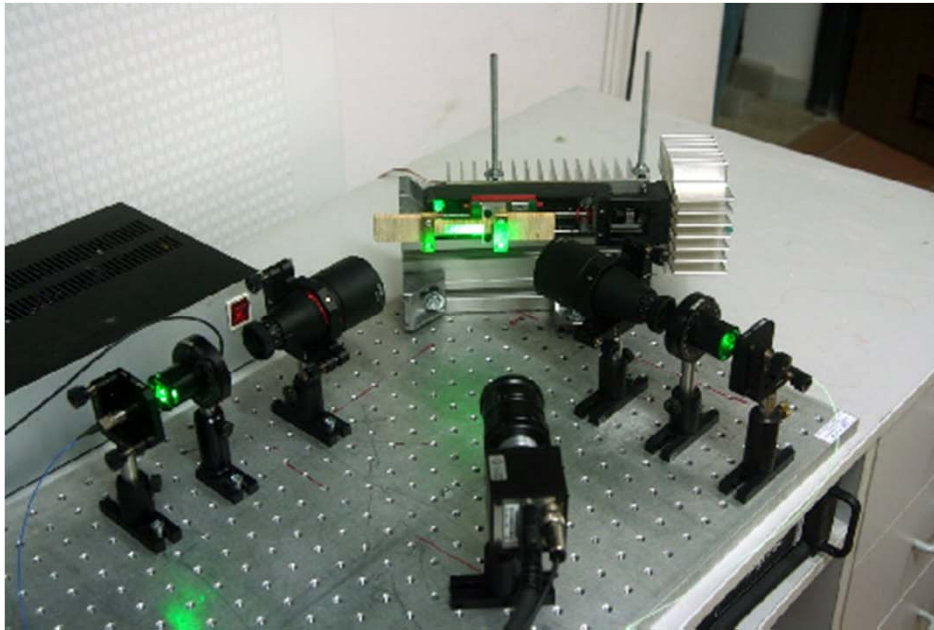
Need for wood understanding.

- The crack pattern on the surface of panel painting also reassembles the growth ring layout.



- Are the strain distributions caused by moisture sorption and external load the same?

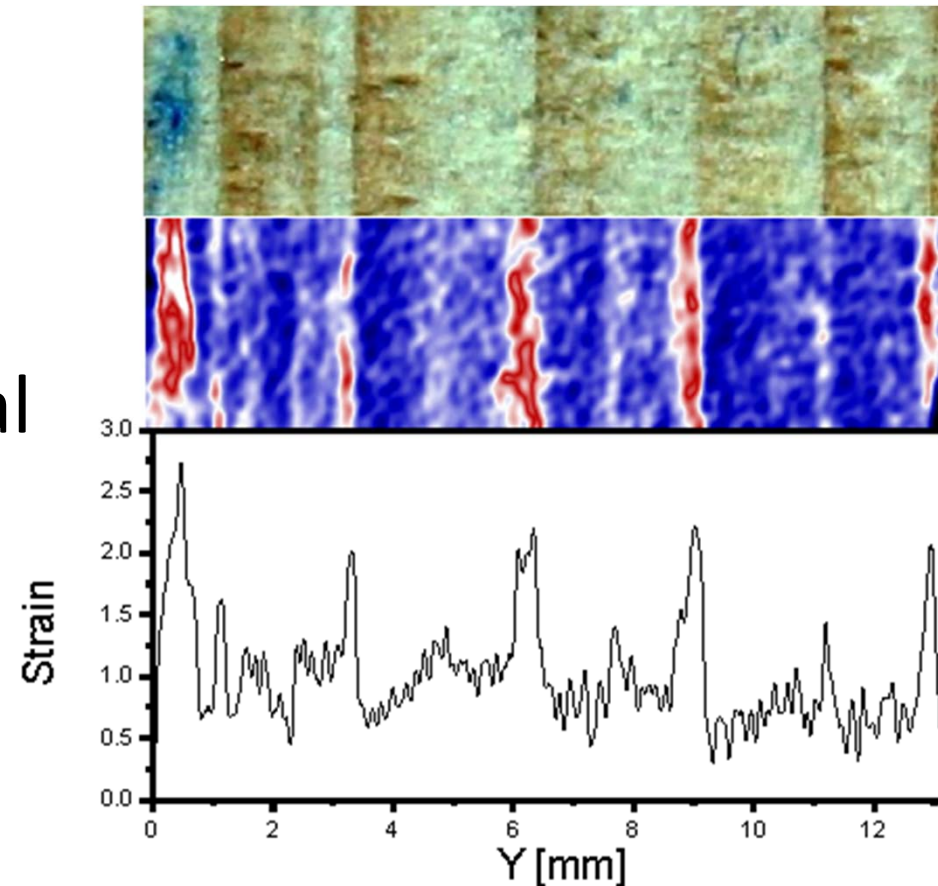
Setup



In speckle interferometry a pair of beams is required for each dimension, so our two-beam, home made setup measures displacements only in one (Y) direction. The light source is a frequency doubled Nd:Yag laser. The optical fibers are used to guide and divide light into each arm.

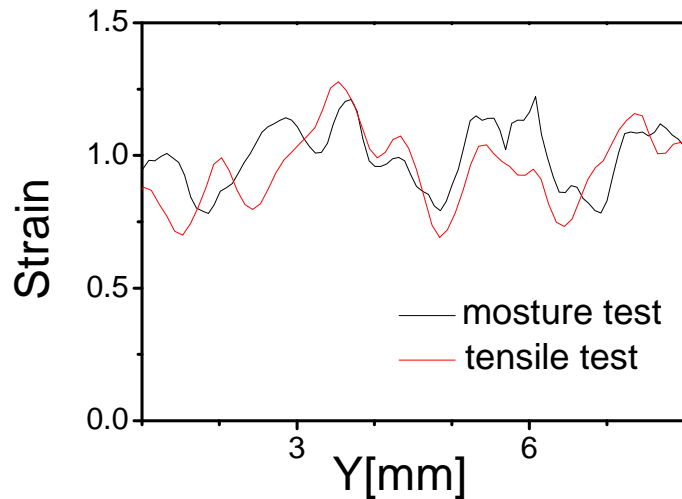
Results (mechanical testing)

- The photograph and the radial strain distribution in the spruce sample. The local strain in the wood can be as large as 3 times above the average.

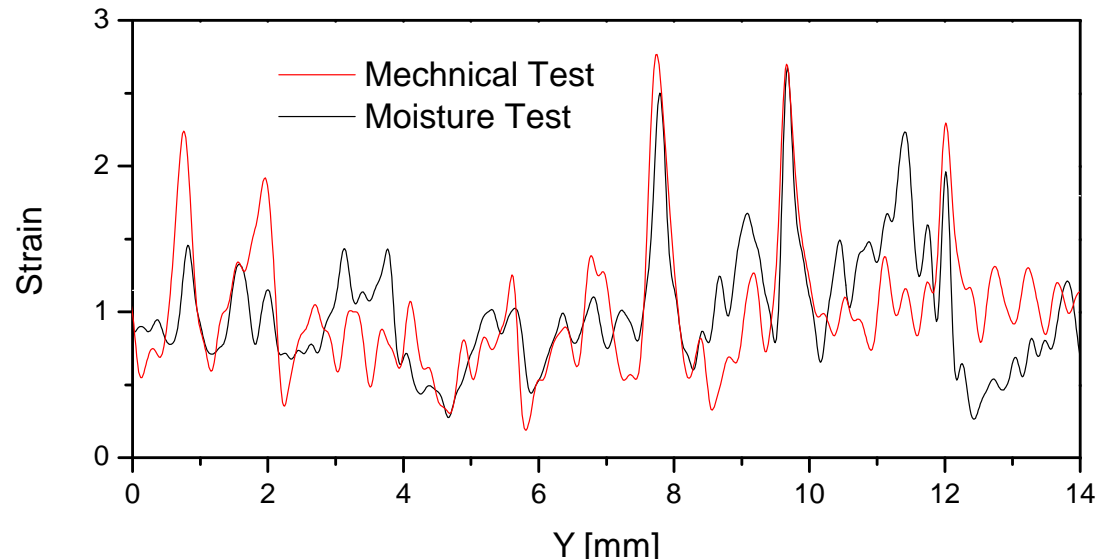


Results (moisture change)

Lime



Spruce



- Maximal local strains in both mechanical and humidity tests are the same.
- The deviation of strain from the average value changes substantially between wood species.