Experimental characterization of wood mechanical performance in constant environment: use of acoustic emission to monitor crack tip propagation

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CONTEXTE & OBJECTIFS

- Use of wood-based materials in sustainable constructions in order to reduce the environmental impact of buildings
- Improve maintenance policies for existing timber structures subjected to decay degradation by monitoring material damage evolution
- Identification of the most relevant descriptors of failure mechanism
- Detection of early warning signs of crack propagation within the material
- Use statistical tools (Probability of Detection) to make more robust the analysis of acoustic activity within the material, so Health Structure Monitoring
WOOD MATERIALS AND SPECIMEN

- Two Massif Centrals Species: Douglas Fir and Silver Fir (in dry state)
- Double Cantilever Beam with variable inertia (notched specimen)
LAB TESTS : MECHANICAL AND ACOUSTIC EMISSION

- Tests performed at ambient temperature (≈20°C)
- Opening mode crack tests using MTS testing machine
- Tests performed at a displacement-controlled velocity of 0.5 mm/min; cell force capacity of 500 N
- Four acquisition channels (only two were used to perform linear localization of AE sources)
- AE sensors: PICO (operating frequencies 200 to 750 kHz)
RESULTS AND DISCUSSIONS

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