MASTER'S DISSERTATION AT STRUCTURAL MECHANICS

DEPARTMENT OF CONSTRUCTION SCIENCES | FACULTY OF ENGINEERING LTH | LUND UNIVERSITY

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PRESENTATION
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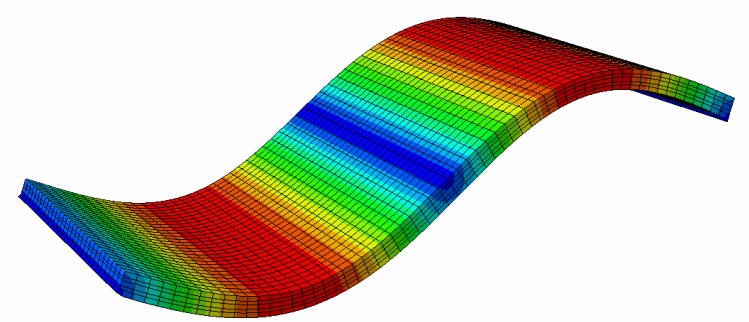
INVESTIGATING THE IMPACT OF LAMELLA MATERIAL VARIABILITY FOR VIBRATIONS IN CROSS-LAMINATED TIMBER PANELS



BACKGROUND

Timber structures are increasingly growing in importance and utilization, driven by an increased focus on environmentally friendly materials, sustainability, and climate change. A contributing factor to this trend is the introduction of cross-laminated timber (CLT). However, residents and people working in multistory timber buildings can perceive vibrations and structure borne noise bothersome despite the structures meeting building regulations. This shows the necessity to improve the design of multi-story wood buildings so that vibration levels and low-frequency structure-borne sound levels are reduced. Previous studies shows that the utilization of elastic material as an intermediate layer could achieve this. However, the possibility to use lamellas of elastic material to increase material efficiency was introduced. The investigation into the optimal orientation, quantity, and placement of these lamellas is an essential area requiring further exploration, forming the foundational context for the master's dissertation. Furthermore, the possibility to use concrete or air as lamellas will be investigated.

AIM

The aim of this master's dissertation is to enhance understanding of the dynamic behavior of CLT panels and investigate how the dynamic performance of CLT panels can be enhanced through the incorporation of insulation boards. This objective will be achieved by addressing the following questions:

- How are the eigenfrequencies altered by the inclusion of insulation boards?
- What materials are most effective for insulation boards to function optimally?
- What is the optimal placement of insulation boards to achieve the maximum reduction in vibration?
- How would accelerations, the most critical factor of comfort, be changed with the utilization of insulation boards?
- How is radiated structure-borne sound affected by the integration of insulation boards?

METHOD

The prediction of vibrations will be accomplished through the utilization of a commercial FE software Abaqus. Various frequency bands could potentially be studied, but the primary focus will be on low frequencies. Furthermore, the main research methodology will be numerical, complemented with literature review.

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