

MASTER'S DISSERTATION AT STRUCTURAL MECHANICS

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



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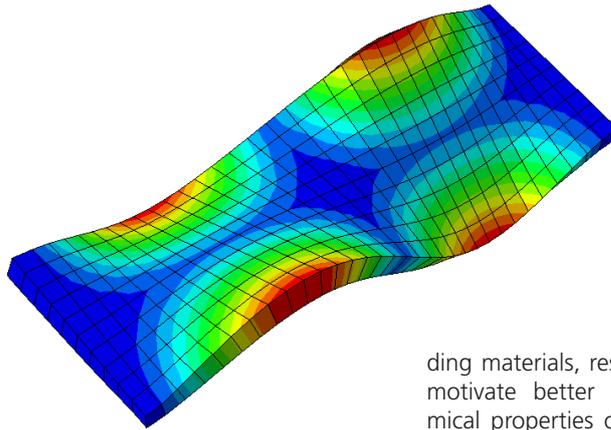
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DYNAMIC RESPONSE OF CROSS LAMINATED TIMBER FLOORS



BACKGROUND

Up until the year 1994 the Swedish government maintained strict regulations for wooden structures, limiting all wooden buildings to no more than two storeys. Since then, the regulations have been revised and the restrictions have been lifted. The subsequent increase in production of large timber buildings and accompanying timber product has also necessitated a broader understanding of the dynamic properties of timber solutions.

Cross-laminated-timber, or CLT for short, is a wooden panel composed of a multitude of wooden planks glued together in a number of layers, where every layer is orthogonal to the previous. CLT-panels are multi-functional and are commonly used for constructing floors, walls and roofs. Given the environmentally positive aspects of CLT-panels, scientific investigation into the subject will result in better understanding of a sustainable building material.

AIM

With this Master's dissertation, I aim to broaden the understanding of dynamical response of CLT-panels subject to various types of dynamic loads. Given the societal interest in more sustainable and environmentally friendly forms of building materials, research into this field may

motivate better understanding of dynamical properties of CLT-construction in urban environments. I will thus enquire into the possibility of analysing the dynamical response of CLT panels subject to various forms of external and internal loads.

METHOD

CLT-panels has the advantage of being light, and thus much easier to transport and install than other conventional building materials, such as concrete or steel. These lightweight properties also contributes to timber constructions being susceptible to both sound transmissions and dynamic response. Expanding on *Johannes Wetterholt's* work in his Master's dissertation "*Modelling cross-laminated timber floors in dynamic analysis*", I aim to extend the work to encompass the dynamical response of CLT-panels due to internal and external loads such as walking, trains or other disturbances.

By constructing a reference model of a CLT-panel in a finite element software, such as ABAQUS, and comparing the eigenvalue results with the results of an equivalent model by reputable scientists, I aim to verify the models validity before proceeding to analyse the dynamic response. Once the reference model has been validated, and the dynamical load analysis performed, I will pursue a simpler model that reliably replicates the results of the reference model, without requiring the same amount of computational power.

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