Master's Dissertation at the Div. of Structural Mechanics

BUCKLING OF A LOAD BEARING TIMBER-GLASS SHEAR WALL
Development of a Finite Element Model

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Presentation
Summer 2013

Report
will be published as report TVSM-5189

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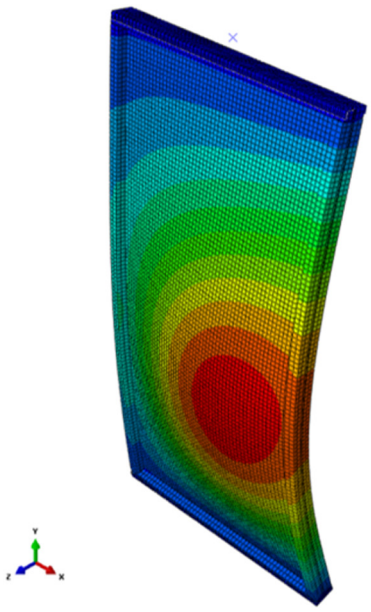
Background
Glass is an appreciated material within architecture. Today, the glass is, however, not in general used as load bearing material, and thus it is necessary to use additional substructures to support and stabilise e.g. glass facades. A good idea in order to save on materials and costs would be to use the glass also as a structural material. Timber has good strength qualities, appealing aesthetically expression and is considered as an environmentally friendly building material. A natural step in the development would be to combine these two materials and allowing them to complete each other's properties.
In a European collaborative research project a timber-glass shear wall element has been developed. This consists of a 10x1200x2400 mm thick glass pane of standard float glass with an LVL-frame adhesively bonded to the glass along its perimeter .In previous research several laboratory tests of these types of shear walls were performed. The tests, performed for various modes of loading, indicated that the shear walls collapsed due to buckling.

Aim & Method
The aim of this master thesis is to further analyse the stability of the timber-glass shear wall element. The results from laboratory tests will be evaluated and the shear wall element will also be analysed with the finite element method using the modelling and analysis computer software Abaqus. The finite element model will be calibrated to match the results from experiments in terms of failure loads assuming failure is due to instability in the shear wall element.
Once a reasonably good fit to experimental data is obtained further analyses will be made on the influence of various parameters (e.g. material and geometry) on the structural behaviour. Of special interest is also to investigate the load bearing capacity when combining vertical and horizontal loads.
The results and conclusions of this work can serve as a background for further experimental testing and for the development of design formulae for timber-glass composite shear walls.



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