NUMERICAL MODELS FOR VERIFICATION OF BEARING CAPACITY OF THE HYBRID TIMBER-STRUCTURAL GLASS PANEL

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Abstract: (250 to 500 words: for each heading use the bullet points or narrative - the submission including graphics should not exceed one page)

The hybrid timber-structural glass panel, which authors are Zarnic and Rajcic, is innovative building element suitable for adaptive façade or as load bearing element. Due to complex behavior of this multifunctional and potentially smart hybrid panel, there is need for computing methods analysis and cloud processing. A key technological element is a digital twin of the real panel where interaction of the digital with the real can be designed and simulated through high performance computing. In order to develop a unique numerical model for design of panel as a building element, it is necessary to consider separately:

- numerical model of joint in panel corner under cyclic lateral load, which proved to be a most significant share of panel bearing capacity
- numerical model of panel under lateral cyclic and constant vertical load

Optimization of model size and precision in order to reduce processing time, versus the correct model settings, represent challenges to generate these models.

Development of these models give significant contribution to better understanding of complex behavior of joint with glued-in rod in the corner of timber frame. With this approach, the model is not only connected with hybrid panel, it also could be applied on similar joints in any timber construction. Implementation of this model into the model of whole element, significantly simplified the analysis and verification of hybrid panel behavior. Due to the complexity and high cost of real scale panel tests, design and verification of the whole panel model is of great importance. This computational research is not only directed to the scientific public, it is also the precondition for introduction of this type of bearing element into software for statics as well as the tool for detailed parametrical analysis in developing of analytical models for practical design.

Numerical models of hybrid timber-structural glass panel, as well as numerical model of joint in corner of timber frame made with glued-in rod, proved to be sufficiently accurate and as such can be used in development of software or calculations due to design code.

Keywords:
numerical model; timber; structural glass; glued-in rods connection; seismic

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