Towards Sustainable Buildings: Novel Strategies for the Design of Vibration Resistant Cross-Laminated Timber Floors (Substrate4CLT)

18. June 2024 – 9:30 – 11:00 AM – IC 6 156/90

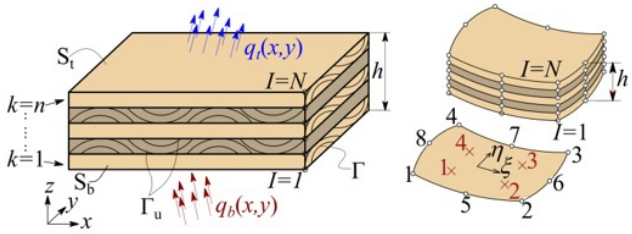
Miroslav Marjanović, PhD Civil Eng.
Assistant Professor, Vice-Dean for Science and Research, University of Belgrade (Serbia),
Faculty of Civil Engineering, Chair of Engineering Mechanics and Theory of Structures

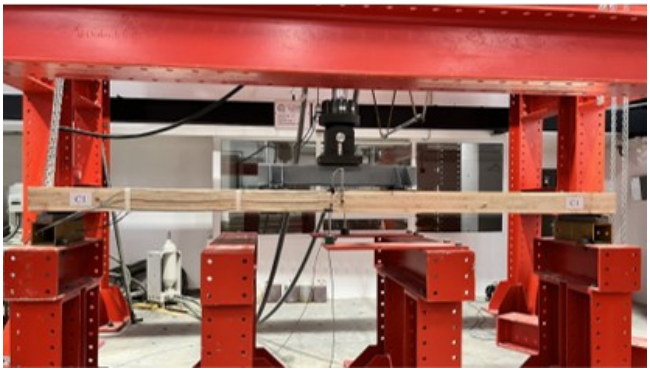
Conventional building materials (concrete and steel) produce approximately 9% of annual global carbon emission, that can be drastically reduced by using wood. Recent technological advances and new construction techniques have led to the development of new natural composite material - cross-laminated timber (CLT), a compelling alternative to the concrete and steel, providing a low carbon footprint and comfortable living conditions.

As a lightweight material, CLT is particularly prone to human-induced vibrations, causing vibration serviceability issues such as annoyance to human occupants and dysfunction of vibration sensitive equipment. To become competitive with concrete and steel in spanning large open space areas in buildings, long-span CLT floors are needed but they are hard to achieve using the conventional CLT floor solutions. Therefore, novel strengthening techniques of CLT are required.

Substrate4CLT aims to deliver sustainable and cost-effective solution for vibration resistant CLT floors primarily designed for large open-floor areas in commercial buildings, by: proposing novel CLT strengthening methods; providing scientifically supported information on CLT dynamic performance through numerical and experimental simulations (using unique walking and jumping force models); developing vibration-based methods and tools for their implementation in structural design.

As a WP3 leader, Prof. Marjanović will present main project goals, so-far conducted experimental program, published results and main project findings. He will highlight some limitations of the current computational models for CLT and present the application of the layered finite elements in computational analysis of CLT, with reference to structural design of mass timber according to Eurocode 5. Finally, some ideas for further work and possible cooperation will be discussed.





Miroslav Marjanović graduated in 2009 (Steel Structures), completed the M. Sc. (Composite Structures of Steel & Concrete) in 2010 and PhD studies (Computational Mechanics of Composite Materials) in 2016, at the Faculty of Civil Engineering, University of Belgrade. He was the Scholar of the SEEFORM Program during 2012-2015 and spent 7 months during his PhD studies at RUB.
Since 2016, he is Assistant Professor in Engineering Mechanics and Theory of Structures at the Faculty of Civil Engineering, University of Belgrade, while from 2021 he serves as a Vice-Dean for Science and Research. His research interests include: theory of laminar composites, nonlinear structural analysis, structural vibration, finite element and dynamic stiffness methods.

Since 2022, he is a leader of the WP3: Numerical simulations and metamodeling of the Substrate4CLT project (www.substrate4CLT.com) financed by the Serbian Science Fund.