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BUCKLING ANALYSIS OF CROSS-LAMINATED TIMBER PANELS USING A MULTISCALE DOMAIN DECOMPOSITION METHOD

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In this work, numerical simulations to predict the non-linear behaviour of slender cross-laminated timber (CLT) structures under compression are investigated. Due to their numerical complexity and inherent computational limitations (memory and time), a multi-scale LaTIn-based Doman Decomposition Method (DDM) is used to perform parallel computations. This strategy uses two scales to reach iteratively the solution by: i) solving local problems on each subdomain and on each interface (microscale); ii) verifying the equilibrium of the whole structure in only some degrees of freedom per interface through a homogenized behaviour (macroscale). It has been successfully applied to treat the rolling shear failure on CLT panels [1] and, more recently, it has been shown that an adequate selection of the iterative parameters (search directions and macroscopic space) and of the mesh's discretization allow to improve the convergence rate, to ensure scalability (i.e. number of iterations is independent of the number of subdomains) and to reduce the computation time of this methodology [2,3]. This improved LaTin-based DDM strategy is here applied to study the effects of buckling on CLT structures. For validating these predictions, numerical simulations are compared with experimental results.

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