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Numerical Methods for Topological Optimization of Wooden Structural Elements

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Abstract : The proposed theme of this article falls within the policy of reducing carbon emissions imposed by the 'Green New Deal' by replacing structural elements made of energy-intensive materials with ecological materials. In this sense, wood has many qualities (high strength/mass and stiffness/mass ratio, low specific gravity, recovery/recycling) that make it competitive with classic building materials. The topological optimization of the linear glulam elements, resulting from different types of analysis (Finite Element Method, simple regression on metamodels), tests on models or by Monte-Carlo simulation, leads to a material reduction of more than 10%. This article proposes a method of obtaining topologically optimized shapes for different types of glued laminated timber beams. The results obtained will constitute the database for AI training.

Keywords : timber, glued laminated timber, artificial-intelligence, environment, carbon emissions
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