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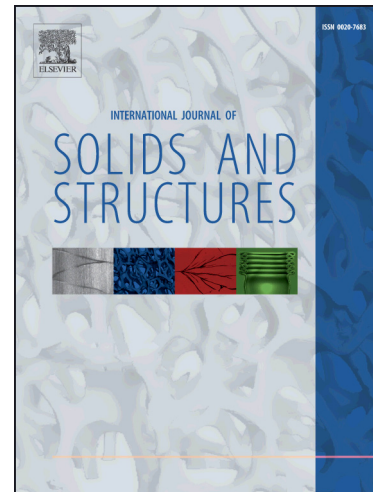
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Effect of cell geometry and material properties on wood rigidity

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Abstract

Rigidity of complex cellular materials, such as wood, depends on multiple geometrical and mechanical parameters of the cell and cell structure. Computational homogenization method gives the effective elastic properties of an infinitely large collection of cells out of a calculation on the representative cell. If the geometric and material properties of the cells are considered constants so that the cell structure can be thought to be built from translating and copying the representative cell. Cell shape, cell wall thickness, and anisotropic elastic properties of the cell wall are accounted for in the application, whereas the cell structure is considered regular. The model gives the effective rigidity of a sample of earlywood, transition-/latewood. The effect of the cell shape and cell wall properties on the effective rigidity is illustrated.

Keywords: cellular material, wood, computational homogenization, rigidity, modeling

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