



Rotational Stiffness at Ridges of Timber Folded-Plate Structures

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Summary:

Folded-plate structures provide an efficient design using thin laminated veneer lumber panels. Inspired by Japanese furniture joinery, the multiple tab-and-slot joint was developed for the multi-assembly of timber panels with non-parallel edges without adhesive or metal joints. Because the global analysis of our origami structures reveals that the rotational stiffness at ridges affects the global behaviour, we propose an experimental and numerical study of this linear interlocking connection. Its geometry is governed by three angles that orient the contact faces. Nine combinations of these angles were tested and the rotational slip was measured with two different bending set-ups: closing or opening the fold formed by two panels. The non-linear behaviour was conjointly reproduced numerically using the finite element method and continuum damage mechanics.

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<https://pdfs.semanticscholar.org/f02e/4110a2e98ccfe5b1250f16e265bf0419603e.pdf>