

ABSTRACT

The rolling shear modulus is very low, leading to rolling shear failure in the cross layer of cross-laminated timber (CLT). The overall objective of this thesis work was to develop an appropriate methodology for measuring the rolling shear properties of CLT. This research consists of three article format chapters, which were aimed at: 1) obtaining a better understanding of advantages and disadvantages of using the bending test and two-plate shear test for determining the rolling shear properties of 3-layer CLT, 2) investigating the influence of growth ring orientation and laminates thickness of cross layer on the rolling shear properties, and 3) verifying the feasibility of two-plate shear test method for measuring the rolling shear properties of 3-layer CLT beam.

It is recommended that the two-plate shear test be used as a testing method for measuring the rolling shear modulus of a cross layer, which can be used to calculate the deflection of a 3-layer CLT beam using the shear analogy method at a given span-to-depth ratio ranging from 6 to 50. An adjustment factor (α) was proposed to predict the deflection under the centre-point bending test at various span-to-depth ratios. The two-plate shear test method can also be used to measure the rolling shear strength, and can provide a reasonable estimate of the load-carrying capacity of 3-layer CLT beam at a relatively large span-to-depth ratio, but a conservative estimate at a small span-to-depth ratio.

In summary, it shall be feasible to adopt the two-plate shear test for determining the rolling shear modulus and strength of cross layer in CLT.