Double-curved timber structure under robotic fabrication scenario

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Abstract

As robotic fabrication with 6 axis brings higher level of flexibility and complexity to timber fabrication than traditional CNC cutting with 3 axis, it brings more possibility to the form of timber structure. Additionally, robotic fabrication avoids the extra data transformation in CNC cutting, implicating coherency from design platform to fabrication. Existing research turns out that with mentioned advantages and different end effectors of robotic arm, curved timber structure could be further explored. "Robotic band saw cutting has been proved to be an alternative solution for producing double-curved beams with high accuracy and efficiency." (Chai et al., 2021).

This review aims at presenting state-of-the-art of double-curved timber structure from design application to robotic fabrication. Furthermore, the research aims at extending the understanding of double-curved timber structures or double-curved timber structure with torsion under robotic fabrication scenario using timber plank as main material. The research would carry out following the workflow of form-finding, timber plank cross joint design, structural optimization and analysis, and finally digital fabrication design. Further testing for fragment or modulus with 1:1 prototype would be carried out to deepen understanding for human-robotic interactive for timber fabrication and assembling.

Keyword

Double-curved timber; Robotic fabrication; Digital design

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