

The design, analysis, fabrication and assembly of an asymptotic plywood gridshell

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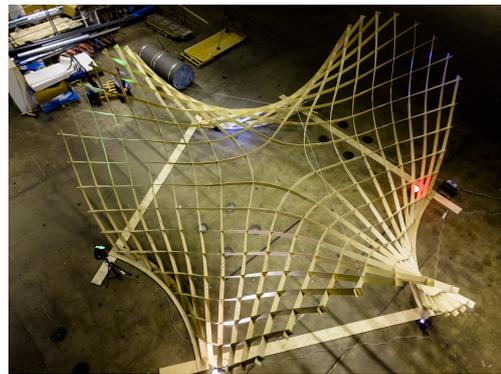
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Abstract

This paper describes the design, fabrication and assembly of an asymptotic gridshell built of 6mm plywood laths. It was built indoors during a two day workshop with undergraduates in an introductory course of parametric design and digital fabrication. The shape is based on an Enneper surface of threefold rotational symmetry with a boundary baseplate inscribed within a circle of 4.5 m in radius. Utilizing the concept of asymptotic curves, which are surface curves whose osculating plane coincides with the tangent plane of the surface[2], the structure could be built using planar straight laths of plywood made using manually operated drills and saws. The grid was assembled flat, generating bending energy in the laths which made the erection procedure easier working in combination with the geometrical and kinematic properties of the grid [1]. Using plywood laths with slot connections, in combination with structural behaviour linked to the geometrical surface properties, made materials tests and physical models a necessary compliment for the analysis and understanding of its local and global behaviour. This paper will also discuss strategies to improve this concept in terms of stability and performance for future applications.



The asymptotic gridshell of 6 mm plywood built and assembled by undergraduate students in December 2018 at Chalmers University of Technology

References

- [1] *Simulating the erection procedure of the Asymptotic gridshell*. <https://vimeo.com/312943826>. Accessed: 2019-01-23.
- [2] D. J. Struik. *Lectures on classical differential geometry*. English. 2nd. Addison - Wesley and Dover, 1961 and 1988.