

Digital Tessellation and Fabrication of the ECHO shell

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Abstract

Complex forms, that in history have always been challenges for architects are now becoming familiar to people working at the edge between architecture and structural design. This is, in particular, true for free form shells design. Free form shells are today undergoing a wider adoption for both permanent structures as well as temporary structures [1]. These last are of particular interest, when they are conceived according to a logic of design for deconstruction, since they can respond to circular economy requirements [2]. This work explores the digital process from design to manufacturing of a shell that has the shape of sounds waves replicating like in an Echo. The structure is made of a sequence of wooden arches and a compact thin shell. The shell combines free form generation with planarization and tessellation processes, using hexagonal discretization. The hexagonal panels are CNC fabricated from 6 mm plywood and are connected together by ad hoc 3D printed joints. The arches follow the hexagonal shell patterns and are conceived as slices of shell continuity and replication. The overall structure is demountable, easy to transport and capable to be reassembled in short time, responding to the principle of design for deconstruction. The result is a neat clean space adapt to any exposition space.

Keywords: digital fabrication, hexagonal tessellation, parametric modelling, planarization, shell design

References

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