

Sustainable lightweight structures constructed with bamboos, paperboard, bricks, nylon and a textile membrane of jute fibers

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Abstract

Conceiving, designing and constructing lightweight structures improving their structural performance based on their form and not on its mass bulk, has been and will keep being one of the main objectives of many structural designers. Structures in which the highest possible degree of sustainability is sought. To the above, the materials to be employed must fulfill the following conditions: being natural, recyclable, of low cost and low energetic consumption in its manufacturing. Some examples of such materials are: bamboos, paperboards, bricks, textile membranes of jute fibers, nylon PA66 and biopolymers.

Our investigation group, constituted by professors and students from the faculties of Architecture and Engineering of the National Autonomous University of Mexico, presents through this project the parametric computer program GEOG and two prototypes developed at the Lightweight Structures Laboratory.

GEOG is a parametric program to form finding of translational grid surfaces with positive or negative double curvature.

The prototype “TGS” was developed based on a surface generated with a translational grid-shell. Its shape follows the inversion of a hanging chains net, guaranteeing that way the work of compression of the whole structure. This prototype will be constructed with Nylon PA66 recycled nodes, bamboo and/or paperboard bars and covered with a textile membrane of jute fibers protected by a light layer of polymeric covering, increasing its rigidity and making it impermeable.

The prototype “LBV” is a structural system constructed with brick vaults made applying the Mexican technique of *leaning brick*, which does not require any formwork.

References

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