Our world in a line: Deploying the reality

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Abstract

Description of the problem addressed by the research:

The main problem of the deployable structures of straight scissors is that they only could be applied to simple geometries as cilinders, spheres, helixes, etc... this situation means that they are very limited from the architectural and structural point of view because for use it in more complex geometries is required the knowledge of the equations that govern the geometrical convergence, equations that until now they were unkown.

Contextualization of relevant previous work:

Since Leonardo Da Vinci analyzed the first deployable structure of straight scissors, numerous authors have improved their designs trough the introduction of new geometries or deployment methods. These structures allow to cover a big space with a high level of packaging and they are more efficient and cheaper in comparisson with other deployable structures.

Description of the methodology:

The main advances in this research have been got thorugh the solve of the problem of the deployment of straight scissors using a purely mathematical point of view instead of the geometrical point of view that have been done previously. This new strategy allows an absolute control of the geometry because the designer can regulate at will the resolution of the tessellation and his orientation with respect to the surface that you want to do unfolded.

Discussion and impact of the results:

The results of this research open a new door in the field of the deployable structure of straight scissors because it allow to do deployable any type of geometry with independence of his complexity. Likewise, this research allow to solve one of the most important disadvantages of these types of structures: The rigidity, doing partial or total triangulated tessellations. An example of this can be observed in the next figures where has been done deployable the Restaurant "Los Manantiales" in Xochimilco, México. For this congress will be done deployable the "Sagrada Familia" of Barcelona (Or a part of it depends of the available time).
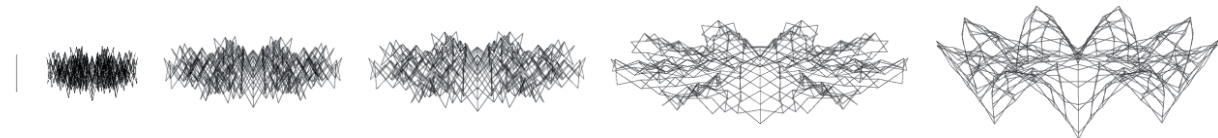
References

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[3] K. Roovers, N. De Temmerman, *Geometric design of deployable scissor grids consisting of generalized polar units*, Journal of the International Association for shell and spatial structures (2017).