

## Case study of a hanging unbraced elastic gridshell for an ephemeral auditorium

Pep TORNABELL\*, Enrique SORIANO, Gerard BERTOMEU, Ramon SASTRE

\*CODA / LiTA BarcelonaTech

ETSAV C/Pere Serra 1 08173 Sant Cugat del Vallès. Barcelona. Spain

actg.corp@gmail.com

### Abstract

We present the design, modelling and construction of a hanging unbraced grfp elastic gridshell for an ephemeral auditorium. Based on recent examples by the elastic gridshell research community we adopt low-tech detailing for a tight budget, namely standard rentable parts from scaffolding industry, but we propose a challenging hanging final stage as a solution for the specific problem of a non destructive lightweight foundation. The final form was solely determined by the dimensions of the branched hanging cables, and the dead load acting on the building system. This study focuses on the modelling and the structural performance of the elastic gridshell with a non fixed boundary. We explain how the modelling and analysis of gridshell and membrane was calibrated between two non-linear structural analysis method (stiffness matrix method and dynamic relaxation). Based on successful minimum deviation between the physical rehearsal model and the prediction model, we proceed to the final construction on site. Moreover we present how the membrane was designed to be placed and allowed the deformation of the underlying grid without distortion or wrinkling. Hanging gridshells showed interesting possibilities for ephemeral activities under restrictive wind conditions.

### References

- [1] du Peloux, Lionel & Tayeb, Frederic & Baverel, Olivier & Caron, Jean-François. (2013). *Faith Can Also Move Composite Gridshells*. Proceedings of the International Association for Shell and Spatial Structures Symposium 2013
- [2] J. Lienhard and C. Gengnagel, “Recent developments in bending-active structures” in *Creativity in Structural Design: Proceedings of the IASS Annual Symposium 2018*, MIT, Boston, USA, July 16-20 2018.