

Dry self-balanced vaulting technology

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Abstract

The purpose of this research is to find a solution for hemispherical self-balancing dry constructions using a minimum amount of different modules [1] (Fig.1). The analysis carried out allowed to define **7 different modules** (Fig.2), which their composition constitute a variety of shape wedges blocks. The blocks shape is the results of a form finding method, in fact, the key idea that leads the definition of them is to find a self-balancing technology.

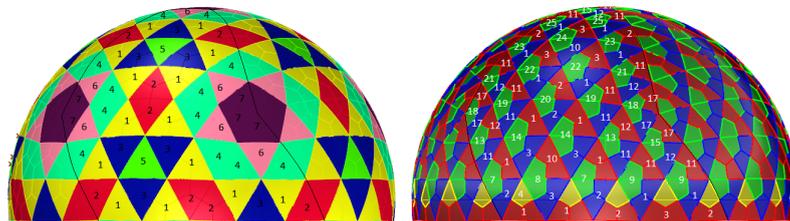


Figure 1: Hemispherical dome numbered by different modules on the left, numbered by composed blocks on the right.



Figure 2: The seven modules necessary to build the dome.

Surely, nowadays technologies as laser cutting or 3D printing allow to build easier a wide variety of form found the shape, but it is also possible to use them to build non-common voussoir blocks. The study has been developed analyzing the existence of self-balancing method [2] [3], it leads to define a new one to built self-balancing dry hemispherical domes. The pavilion can be constructed without using supports by laying blocks with a ring pattern and linking the two consecutive levels with a vertical piece (green pieces, see Fig.3) to give continuity during the building process. At the moment we are testing the dome by using blocks made of laser-cut cardboard.

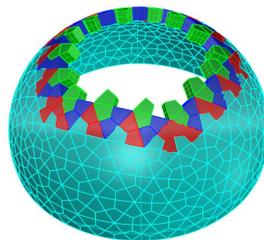


Figure 3: Construction process with blocks obtained by different couples of modules.

References:

- [1] D. Richeson, *Euler's Gem: The Polyhedron Formula and the birth of Topology*, Princeton, 2008.
- [2] D.Wendland, Traditional Vault Construction Without Formwork: Masonry Pattern and Vault Shape in the Historical Technical Literature and in Experimental Studies, *International Journal of Architectural Heritage*, 2007.
- [3] J. Ochsendorf, *Guastavino Vaulting: The Art of Structural Tile*, Princeton, 2010.