Lines and surfaces in domes and vaults

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Abstract:

The external surfaces delimiting significant buildings or the forms characterizing their interiors are normally very elegant and well-proportioned.

Some observers frequently consider these shapes only from an artistic point of view and underline principally the aesthetic aspect; others, because of their scientific-technical background, try to evidence also the structural and mathematical properties. The observers just mentioned are conscious that the pleasant harmony of an architectural structure comes also from the intrinsic geometrical qualities.

Therefore as Mathematicians interested in Architecture and Arts, we would like to diffuse the idea that the shape's harmony comes not only from the artist's creativity but is also strictly connected with mathematical rules. The more you know mathematical tools the more you understand and appreciate the form's beauty.

In this paper we intend to focus lines and surfaces often involved in domes and vaults. The aim is to illustrate building's roofs and ceilings in mathematical way, to underline their configuration and some essential peculiarities not always evident at first glance.

At the same time it comes out a mathematical curiosity about measuring lines, surfaces or volumes, connected with vaults and domes.