Manfredi Nicoletti

***Sergio Musmeci. Organicità di forme
e forze nello spazio***

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Reviewed by Alessandra Capanna

Sergio Musmeci's very cultured and refined activity is the answer to those who believe that the studies concerning the relationship between architecture and mathematics are much too theoretical. Musmeci is one of the most daring and transgressive engineers born in the twentieth century; he was master equally of music, astronomy, aeronautics, mathematics, and philosophy, all of which informed his structures, whose shape was determined by the spatial distribution of static actions. Musmeci thought that he could reach the expression of "modernity" through science. He is the designer of a project for the bridge on the Strait of Messina that has been only recently understood and appreciated, more than twenty years after its conception.

In this brief but intense monography, published in the series "Universale di Architettura" by Testo & Immagine of Turin, author Manfredi Nicoletti, friend of Musmeci "in ideas, amusements and projects", takes the opportunity to speak about and to remember Musmeci. Nicoletti and Musmeci were collaborators, Musmeci having studied a mathematical configuration for Nicoletti's helicoidal skyscraper, which consisted of a succession of warped wings developed on the layout of the logarithmic spiral. The images of this mathematical skyscraper are reproduced at the end of the book, which is conceived as an introduction to Musmeci's studies on aggregate structures, resulting directly from his research concerning the 17 crystallographic groups in the Cartesian plane and the 230 crystallographic groups in three-dimensional space. He described his buildings as if they were constructive systems in which all the geometrical components are coordinated according to spatial systems.

The book consists of two parts that complement one another. The first part is the exposition of his research subjects and the explanation of their geometrical and scientific characteristics. The second part reviews Musmeci's works. His works are substantially of two types. The first ones are referred to as "geometry of the continuous", as in the constructive technique of the lightweight stressed skin structures and improved in Musmeci's "form with

no name” elaborated for the bridge on the Basento (pp. 60-67). This bridge is better illustrated in this book than in earlier publications about it, written in the fifties. “The forms can be truly defined as three-dimensional because they are endowed with a different kind of curvature and orientation in space, in every point, because in space the intensity and the direction of strength at each point will be different” (p. 23). So Musmeci conceives, in a definitive way, an overcoming of the structural empirism of the nineteenth century. During that period the construction of spatial forms was obtained through automorphic transpositions of symmetries through the rotation or the traslation of plane figures, so that the volume was directly connected with the concept of structural minimum.

This subject of research, crisscrossing through Musmeci’s studies, is testified to from the very first pages on, beginning with the story about the solution of a scientific problem in which he was engaged since he was a student, the determination of the arch-limit shape. “Its equation is $y = \log \cos X$ (a part from some multiplicative constants depending on the resistance of building materials)” and it looks like a very extended parabola. This curve has some very interesting properties, particularly that the angle between the median axis of the parabola and the horizontal line is proportional to its abscissa, that is, the distance from the vertical axis. The limit span of this arch is that distance corresponding to a 90° angle.

The other subject of Musmeci’s research concerns those aggregated structures that are the expression of a geometry of discontinuity, represented by the crystallographic conformation of trussed structures. In 1979 in Piazza San Salvatore in Lauro, Rome, Musmeci exhibited his works on aggregated structures (pp. 43-52), illustrating the “enigmatic and sharp space frames”, that are trussed systems geometrically constructed through the same formative process of regular and irregular polyedrons and their reciprocal transformation from one into the others. His studies on polyedrons culminated with the definition of the anti-polyedron, a potentially unlimited and undetermined geometrical figure, even though it was generated from regular figures (pp. 19-22).

Nicoletti’s homage to his friend is particularly important in light of the fact that there are very few publications about Musmeci, and that Musmeci’s research is often hardly understood, with the exception of a very interesting monographic number of the italian review *Parametro* (no. 80, October 1979) written by Musmeci himself, explaining his aesthetic and philosophical theories, illustrating the scientific and mathematical basis of his researches and finally bringing to light the historical origins and the processes for obtaining ever greater knowledge from which his architectures come.

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