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# THE DELAUNAY TRIANGULATION IN SHAPING ARCHITECTURAL BAR STRUCTURES

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The formation of original rod structures has become an increasingly complex multi-criteria design process, which at the same time aims at the search for unique spatial systems as effective engineering solutions. A particular aspect of these multi-faceted activities is the optimal shaping of the architectural design. In the search for synergistic solutions that combine aesthetics with structural design logic, the modern bionic trends play an important role that enable a reproduction of the organic shapes not only by their proportion, but mainly through a simplified reconstruction of the biological processes of development and the understanding of the form structures occurring in the natural world. The analogies between the architectural design processes and the morphogenesis of the bionic form led to an increase in bionic structures as a whole. The improvement of the digital tools based on algorithmic codes enabled architects to create bold concepts based on the logic of nature's technology.

One of the most interesting structural bionic discretization methods is the Delaunay triangulation, which is a dual graph of the Voronoi Diagram describing the divisions of the plane and space which occur in nature. These are: a dragonfly wing, giraffes spots on the skin or turtle's shell. Delaunay divisions are now being increasingly used in designing architectural rod structure forms. Such solutions are achieved by generative modeling, whereas the algorithm digitizing the surface is incorporated in 3D modeling tools. A big advantage of using digital generators in the search for optimal solutions in architecture and design is the ability to model multi-variant solutions and the ease of their modification (the model is formed by iterating figures).

This paper will present study trends in the development of bionic flat and spatial rod structures based on Delaunay division, as well as own research results for the selected rod systems. Due to the efficiency of the use of material, the undertaken analyses pertain to the comparison of configured rod-like structures.