

M. Ustymenko

Research supervisor: O. A. Chemeris

Candidate of Pedagogical Sciences,

Associate Professor

Zhytomyr Ivan Franko State University

Language tutor: L. P. Serdiichuk

SURFACES OF THE SECOND ORDER AND THEIR APPLICATION IN ARCHITECTURE

Analytic geometry, also called coordinate geometry, is a mathematical subject in which algebraic symbolism and methods are used to represent and solve problems in geometry. The importance of analytic geometry is that it establishes a correspondence between geometric curves and algebraic equations.

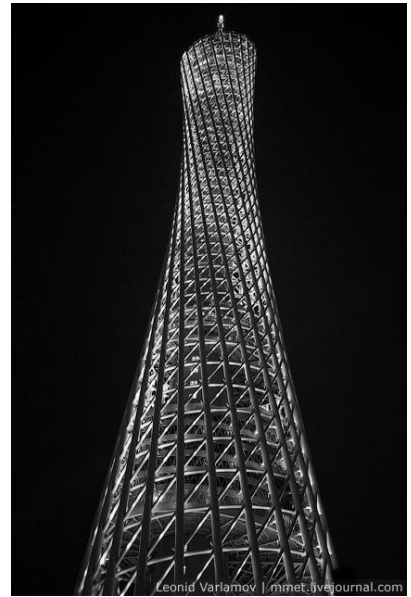
The surfaces are part of the analytical geometry section. The basic concepts of analytic geometry were first formulated by the philosopher and mathematician Rene Descartes in 1637. Gottfried Wilhelm Leibniz, Isaac Newton and Leonard Euler developed his ideas and raised analytic geometry to the modern structure.

Geometry can also be seen as a structural science. The architectural design is based on geometric structures developed out of the idea of transformations. The symmetry transformations are visible as design concepts through history of architecture. In contemporary architecture, there are no fixed rules about design concepts. But there are still relations to geometric space concepts.

Surfaces of the second order have had wide practical application in science and industry. First of all, they can be used in different constructions creating buildings of unusual, extraordinary and fascinating shapes and sizes.

For example, the *Canton Tower* or *Guangzhou Tower* is now the second tallest tower and the fourth tallest freestanding structure in the world. The tower is world famous for its twisted shape and hyperboloid structure.

The form, volume and structure of the tower is generated by two ellipses, one at foundation level and the other at a horizontal plane at 450 m. These two ellipses are rotated relative to another. The tightening caused by the rotation between the two ellipses forms "waist" and a densification of material halfway up the tower. This means that the lattice structure, which at the bottom of the tower is porous and spacious, becomes denser at waist level. The waist itself becomes tight, like a twisted rope; transparency is



a

reduced and views to the outside are limited. Further up the tower the lattice opens again, accentuated here by the tapering of the structural column-tubes.

The Round House. This architectural monument was created at the beginning of XIX th century. It is located in the village of Golovchino, Belgorod region (Russia). The brick building consists of two cylinders – the large (diameter 26 m) and the small (diameter about 10 m) ones. The smaller one is build inside the larger one, rises above it and ends with a dome. Inside the small cylinder all the floors are combined with stairs. There is a museum in this building now.

So, analytic geometry has found important applications in science and industry.

References

1. Аналітична геометрія / За заг.ред. В. П. Белоусової. – К.: Вища школа, 1973. — 328 с.
2. Погорелов, А. В. Аналитическая геометрия / А. В. Погорелов. –М.: Наука, 1978.—208 с.