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THE FOUNDATIONAL PROBLEMS
OF GEOMETRY IN N.I. LOBACEVSKIJ'S THOUGHT

Abstract

The importance of Lobacevskij's geometry not only consists in the solution of the ancient problem of parallel straight lines, but in the original contribute Lobacevskij gives to the foundational problems of geometry too.

The Russian geometer rejects the Platonic aspects of Euclidean geometry and the metaphysics of ruler and compasses, which characterized the Euclidean geometrical tradition, and founds his geometry from an empirical point of view. However he is not a sensist, but he follows the tradition of English empiricism of Locke and the philosophy and the scientific contributes of D'Alembert and L. Carnot. His geometry of solid bodies is really a physical geometry, based on the external world starting from which we arrive, thanks to a new operation (the section), at the first notions of geometry.

Lobacevskij follows the epistemological conception of L. Carnot, who had founded his works not on self-evident principles, but on a central problem. This contribution of L. Carnot and Lobacevskij constitutes, from a historical point of view, an alternative to the Euclidean-Aristotelean axiomatical pattern, which has been considered for many centuries the only way of organizing a scientific theory.

The Lobacevskijan geometry is not based on axioms; particularly, his *Untersuchungen Geometrische zur Theorie der Parallelilien* (1840) is based on the problem of how many parallel straight lines there are through a point to a given straight line.

Moreover, Lobacevskij links his geometry to the infinitesimal calculus, the spherical trigonometry and the Euclidean one, for showing the consistence of it. A contradiction in the hyperbolic geometry would been the end of many fundamental fields of mathematics.