Witold SZYMAŃSKI
Politechnika Wrocławska
Zakład Geometrii Wykreślnej i Perspektywy Malarskiej
Wydziału Architektury Politechniki Wrocławskiej
ul. B. Prusa 53/55, 50-317 Wrocław
tel. 71 784 35 82, e-mail: witoldszymanski@o2.pl

ON A GEOMETRIC INTERPRETATION OF ARITHMETIC RELATIONS AND ON ITS USAGE IN THE THEORY AND DIDACTICS OF PERSPECTIVE

In the this work the problem of numerical description of spatial directions and the usage of such a description in graphical perspective methods is addressed. Solutions suggested by the author are original and do not exist in the literature of the subject or in the sphere of computer graphics. Their purpose consists in the possibility of drawing up and designing the perspective in a spatial structure of any complexity, e. g. in architecture, with the exception of projections, which are indispensable when using the known perspective methods.

The original aspect of this method consists in the adoption of a triple flat frame of reference, which had not been used earlier, consisting of three numerical axes. Therein the quotient of two random real numbers are determined (together with their values). A pair of numbers determines the direction of a straight line on a plane whereas the value of the quotient of this pair – the point of a perspective junction.

The author intends to generalize this method to a four-dimensional frame of reference and to use it for the purpose of defining three real numbers, which will allow one to determine any spatial direction and its perspective junction.

Working from this generalization the author has found an earlier unintended solution. He has interpreted and geometrically solved the relations of division and multiplication in a simpler way. The history of this problem dates back to Greek geometry and mathematics. The structure proposed by the Pythagoreans requires using Pappus's theorem and Desargues's centroid theorem. However, only in the twentieth century has it been proved that this proposition is true.

As a result of the first experimental applications of the elements of the above mentioned method in perspective didactics, the works of the students of Architecture faculty were created. They are unparalleled both methodologically and in the range of the obtained geometrical results.

The inconvenience of the currently known perspective methods consists in the fact that they require the application of the projections of the drawn spatial structure. The proposed method eliminates this inconvenience (it does not require any projections or an earlier system design) and makes of the perspective a very effective tool to design the spatial systems that are randomly advanced.

Many of the students' works where this method is used in practice have been presented at international geometrical conferences and at many exhibitions both in our country and abroad.