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**PLACE AND ROLE OF COMPUTER GEOMETRICAL MODELLING IN  
MODERN SCIENCE, EDUCATION AND INDUSTRY**

**Annotation**

This work describes the place and role of computer geometrical modelling in modern science, education and industry. The purposes and prime tasks in appropriate field of the man habitability are formulated. Some ways of further scientific investigations for resolution of existing problems are offered.

**Key words**

Computer information technologies, education, geometrical modelling, industry, science.

**I. Introduction**

Innovation way of evolution is typical for the history of mankind. The main feature of the state-of-the-art phase is in the rash acceleration of the mentioned processes.

Such spheres of social activity as science, education and industry play a key role in the technical progress.

New ideas arise within the first sphere, become a reality via the second, and are being utilized in the third.

Modelling (full-scale physical or abstract mathematical one) is one of the effective methods of obtaining knowledge about different things surrounding us.

It is worth to mention that in the same time in many cases the use of geometrical parameters is in need to define shape, dimensions and spatial location of studied

objects.

Modern computer techniques allow rising of the pointed above researches to even higher level.

Scientific achievements in the spheres of applied geometry and computer information technologies are the appropriate basis in this case, since they enable effective mapping of composite curves, surfaces and solids, as well as broad using of mentioned models in the key industries.

Thereupon the methodology of structural- parametrical approach [3] is the perspective trend in the computer geometrical modelling. This methodology is being developed by the authors of this article in collaboration with other staff of the sub-faculty of descriptive geometry, engineering and computer graphics of the National Technical University of Ukraine “Kyiv Polytechnic Institute”.

## **II. Problem statement**

In order to achieve the successful results in science, education and industry the up-to-date geometric models must meet the following requirements:

- qualitatively visualize of surrounding us things and phenomena;
- allow precisely and quickly calculate various geometrical parameters and characteristics;
- ensure flexible and high-performance corrections into displayed images;
- be the integration basis for all the other models of the object under investigation or the object in creation phase;
- dispose of the tools for conduction of comprehensive optimization;
- possess convenient and easy-to-use user interface.

## **III. Results**

Key theoretic regulations of offered structural- parametrical methodology of computer geometrical modelling of complicated technical units as well as references to the more detailed information are mentioned in [3].

At the same time the main idea consists in wide use of system (structural) approach in addition to the popular nowadays method of parametrical description of geometric figures [1, 2].

The structural approach consists in considering of the arbitrary object as a potential element of more complex structure while considering components of this object as systems of a lower level.

Formulated basic principles of structural parametrical approach and major typical stages of computer modelling are stated in [3].

The obtained new scientific results are used during the lectures and practical courses in the National Technical University of Ukraine “Kyiv Polytechnic Institute” as well as while preparing of term papers and degree works by the students of mechanical specialties.

Nevertheless the main criterion of the effectiveness of carried out investigations is practical implementation of corresponding scientific efforts into the industry.

Concerning this it is worth to mention that some elements of structural-parametrical computer geometrical modelling methodology of complex technical objects are already successfully realized at the O. K. Antonov Aircraft scientific and technical facilities (Kyiv, Ukraine) during a design of the new aircraft “AH-148” and subsequent production of its components at Kharkiv state aircraft manufacturing plant (Ukraine).

Nowadays the mentioned above approach is spreading to other key industries since it allows effective implementation of multiple-choice analysis of investigated objects and processes in order to achieve their all-round optimization.

#### **IV. Conclusions**

Analyzed above structural-parametrical approach is the logical consequence, extension and more in-depth version of the parametrical computer shaping methodology, which is popular nowadays in engineering graphics.

It is worthwhile to consider of the cited facts as innovations in science, education and industry since indicated method ensure not only obtaining of new

knowledge but also its direct practical implementation.

The creation of geometrical models, which are able to effectively support of all stages of the life cycle of complex technical products starting from scientific researches, design, production and ending with operation including utilization , can be considered as a perspective direction.

Indicated tendencies require conduction of further scientific investigations by the specialists in fields of applied geometry and computer information technologies.

### **References**

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