

## ELEMENTS OF SPATIAL CYCLOGRAPHY

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In modern CAD/CAM systems and in CAGD (Computer Aided Geometric Design), models of geometric objects (lines, surfaces) of space  $R^4$  in space  $R^3$  and vice versa are used. The analysis of geometric models used in such systems allows us to conclude that research is relevant to the development in  $R^3$  of analytical models of lines and surfaces of the space  $R^4$ . In this paper, we show the possibility of obtaining of constructive-analytical model using the three-dimensional drawing of the space  $R^4$ , proposed by N. V. Naumovich. Based on this drawing, a constructive interpretation of the proposed analytical model is given and its implementation is realized in a virtual electronic 3D-space. The model of the  $R^4$  space curve proposed in this paper is based on the theoretical positions of the spatial cyclography realized in Naumovich's three-dimensional drawing. This proposed model differs from existing ones using the analytical method of modeling. The essence of the proposed constructive-analytical modeling consists in the geometric representation and interpretation in the three-dimensional drawing of the cyclographic images of points, lines, the set of points and lines of the space  $R^4$ . The constructive-analytical modeling of the  $R^4$  space curve on the basis of the cyclographic mapping and the possibility of its realization on Naumovich's three-dimensional drawing allow to get a full picture of the interrelation and mutual influence of all the elements of the model. Such a representation is based on the implementation of a 3D-drawing in virtual electronic 3D-space with the means of modern graphical CAD and allows solving the optimization of the developed models of geometric objects in relation to the requirements of modern CAD/CAM systems and CAGD.

**Keywords:** cyclography, lines and surfaces, geometric modeling, multidimensional space, three-dimensional Naumovich's drawing, channel surface.

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