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CONSTRUCTION OF MULTIDIMENSIONAL RULED SURFACES

The formalized method of constructing ruled surfaces that don't consist of union of a finite number of plane figures, such as various prisms, pyramids and etc is presented in this article.

It is necessary to mark that the classification of surfaces settling all their types doesn't exist, but the thing that unites them all is: if dimensionality of set of lines in space is equal k, dimensionality of set of these lines is equal 1. So for construction in general multidimensional ruled surface from the given set of lines the following steps should be taken:

1. put any relations which total dimensionality is equal k-1 in this set;
2. provide a condition of compatibility of these relations.

From here follows that it is necessary to receive the list of various relations with the calculated dimensionalities values of these relations in advance for each line which will be used as generating line.

On the basis of above the stated rule, the general algorithm of creation and research of multidimensional surfaces is:

1. determine a dimension of variety or a dimension of variety of some forming subspaces,
2. determine a dimension of desired conditions and sub-varieties of created variety,
3. determine a correctness of some assigned tasks,
4. determine some algebraic characteristics of created variety if it is considered as one-parameter set of subspaces.

For example, we consider construction of a hyper surface of 4 measured spaces with generating line is 1-plane.

Following the general algorithm of construction of varieties, we receive:

1. Dimension of variety of 1- surfaces of four dimensional space is equal 6:

$$\mathrm{D}_4^1 = (4-1)(1+1) = 6$$

2. In a character type it is possible to present a condition of incidence and their dimensionality as:

$$e_{4,2}^{1,0} - 1; e_{4,1}^{1,0} - 2; e_{4,0}^{1,0} - 3; e_{3,2}^{1,0} - 2; e_{3,1}^{1,0} - 3; e_{3,0}^{1,0} - 4; e_{2,1}^{1,0} - 4; e_{2,0}^{1,0} - 5; e_{1,0}^{1,0} - 6$$

Conditions of p-parallelism to a 1-plane: $e_{4,2}^{1,0} - 1;$

The 1-plane is parallel hyper plane: $e_{4,1}^{1,0} - 2;$

The 1-plane is parallel 1-plane: $e_{4,0}^{1,0} - 3.$

3. Since hyper surface contains two-parameter variety of 1-planes total dimension of conditions should be 4. Let's represent in a character type some of constructed hyper surfaces:

$$1.(e_{4,2}^{1,0})^4;2.(e_{4,2}^{1,0})^2 e_{4,1}^{1,0};3.(e_{4,2}^{1,0})^2 e_{3,2}^{1,0};4.(e_{4,2}^{1,0})^2 e_{4,1}^{1,0};\text{ etc.}$$

4. Let's define structural characteristics of the hyper surface presented in a first character type.
5. Hyper surfaces of four dimensional space with a 1-plane generating line and quadruple of guiding lines of 2-planes which are mutually intersected only in 0-planes, have the order equal to three, and a class is equal two.

$$(e_{4,2}^{1,0})^4 = 3e_{3,0}^{1,0} + 2e_{2,1}^{1,0}$$

If we increase the received representation of hyper surface in a character type on $e_{4,1}^{1,0}$, we receive $3e_{1,0}^{1,0}$, and if on $e_{3,2}^{1,0}$, we receive $2e_{1,0}^{1,0}$.

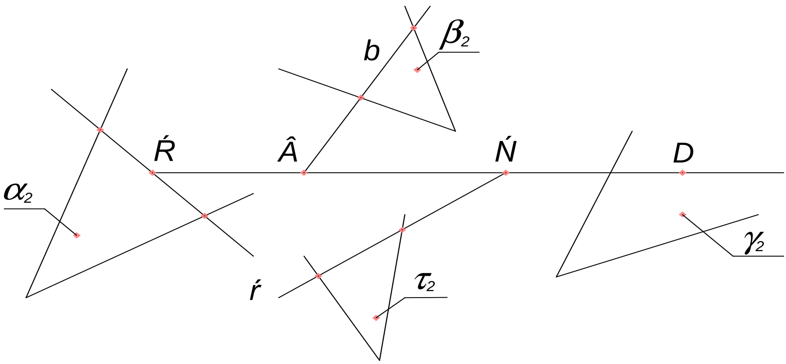

Fig1. Schematic-constructive creation of hypersurfaces generating lines.