

UNIVERSAL MATRIX CODING SYSTEM FOR TECHNICAL WEFT KNITWEAR FOR COMPUTER-AIDED DESIGN SYSTEMS

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Abstract:

This article highlights the design of a universal matrix system for coding weft knitwear for technical purposes for computer-aided design systems. The matrix coding of the graphic recording of the knitwear of the basic and weft weaves is determined.

Key Words:

Computer-aided design, algorithmic language, structural analysis of knitwear, universal matrix coding system.

I.Introduction

The use in the knitwear industry of machines with electronic control of the knitting process, which makes it possible to quickly master the production of new assortment of products and design them using a computer, created the prerequisites for the development of a computer-aided design (CAD) system for knitwear.

The current state of CAD for knitwear is characterized by the widespread use of various languages for recording the reproduction of knitwear, the introduction of various systems for the computer-aided design of weaves, products and fabrics, and the expansion of a computer application package.

In the implemented CAD systems of knitwear, special algorithmic languages for describing the structure of knitwear and matrix methods for representing its structure, which are used for knitwear of a limited number of weaves, are most widely used. In the first case, compiling the initial data requires a laborious structural analysis of knitwear with insufficient clarity. In the second case, only jersey of a certain structure is described. As in the first and second cases, the computer-aided design of knitwear is carried out according to special algorithms, the compilation of which is laborious and is one of the most expensive operations in CAD [1].

II. Method Of Experiment

We investigated the possibility of constructing a universal matrix coding system (UMC) for the structure of knitted fabrics of any curly weaves. The main requirements for teaching materials are as follows:

- Presentation of information in a form suitable for machine design;
- Visual presentation of information, that is, presentation of the initial information about knitwear in a form as close as possible to the pattern patron;
- Comprehensive descriptions of the structure of the largest possible number of subclasses of knitwear that have found practical application.

III. Experimental Results

The coding of weft knitwear for technical purposes in the UMK is carried out by independent and uniform coding separately for each of its sides. Therefore, in the future, it is sufficient to restrict ourselves to the description of the UMC for one side of jersey or single jersey.

Each element of the pattern is described in the form of a matrix of small dimensions, consisting of one or more columns and with the number of rows equal to the number of threads in the set. Each line of this matrix encodes the insertion of the corresponding thread of the set in the

considered element of the pattern matrix and additional operations with this thread or loops formed by it.

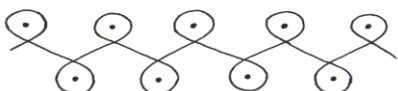
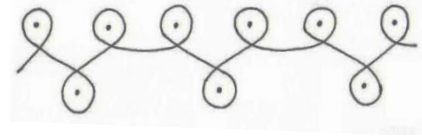
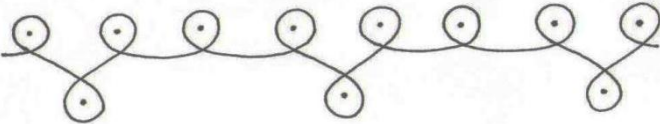
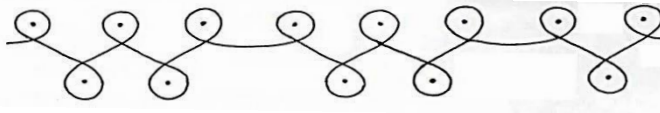
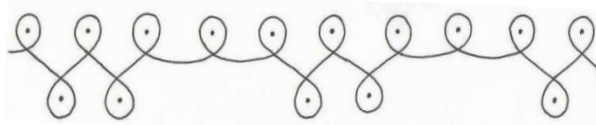
One of the main stages of knitwear design automation is the formation of its structure in the form acceptable for a computer. For this, special algorithmic languages and matrix methods are used to represent the structure of knitwear, taking into account the number of weaves.

For this purpose, the main elements of the knitwear structure have been identified, which include: loop, broach and outline, which are called basic. With this approach, for each needle, we enter the designations: 0 - upper needle; 1 - lower needle. The needles can be in two positions. If it is lowered, that is, the initial position, then it is designated as "0", if it is raised, then "1".

For coding of weft knitted weaves for technical purposes, the following code designations are used: 000 - upper needle, the thread runs straight; 001 - upper needle, the yarn feeder is changed; 011 - top needle, a loop is created; 100 - lower needle, the thread runs straight; 101 - lower needle, the yarn feeder is changed; 111 - lower needle, the needle is raised, a loop is created.

Table 1.

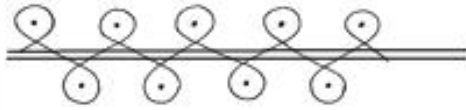
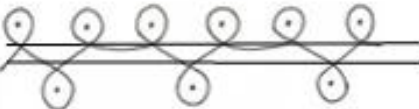
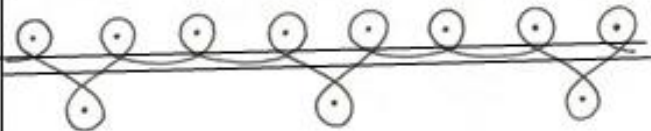
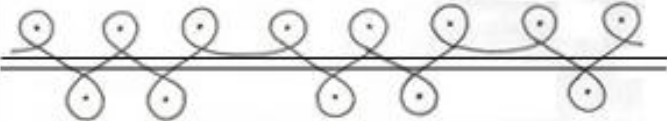
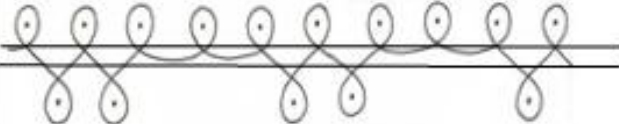
Matrix coding of graphic recording of knitted fabrics of basic weaves for options No. 1, 6, 8, 10 and 12

Matrix coding	Graphic notation of weft knitwear	
1 - row $\begin{bmatrix} 011 & 011 & 011 \\ 111 & 111 & 111 \end{bmatrix}$ 2 - row $\begin{bmatrix} 011 & 011 & 011 \\ 111 & 111 & 111 \end{bmatrix}$		option No.1
		option No.6
		option No.8
		option No.10
		option No.12

Definition: 0 - upper needle; 1 - lower needle; 11 - a loop is formed on the needle; 011 - a loop is formed on the upper needle; 111 - a loop is formed on the lower needle.

Table 2.

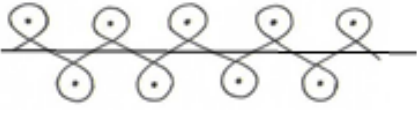
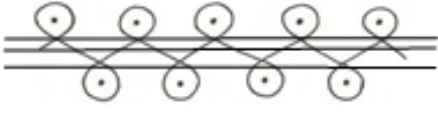
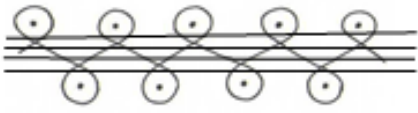
Matrix coding of graphic recording of weft technical knitwear for options No. 3, 7, 9, 11 and 13

Matrix coding	Graphic notation of weft knitwear	
1 - row $\begin{bmatrix} 011 & 011 & 011 \\ 111 & 111 & 111 \end{bmatrix}$		option №3
		option №7
		option №9
2 - row $\begin{bmatrix} 000 & 000 & 000 \\ 100 & 100 & 100 \end{bmatrix}$		option №11
		option №13
3 - row $\begin{bmatrix} 011 & 011 & 011 \\ 111 & 111 & 111 \end{bmatrix}$		

Definition: 0 - upper needle; 1 - lower needle; 11 - a loop is formed on the needle; 00 - the thread is not laid on the needles, passage; 011 - a loop is formed on the upper needle; 111 - a loop is formed on the lower needle; 000 - no thread is laid on the upper needles, passage; 100 - no thread is laid on the lower needles, pass.

Table 3.

Matrix coding of graphic recording of weft technical knitwear for options No. 2, 4 and 5

Matrix coding	Graphic notation of weft knitwear	
1 – row $\begin{bmatrix} 011 & 011 & 011 \\ 111 & 111 & 111 \end{bmatrix}$		option №2
2 – row $\begin{bmatrix} 001 & 000 & 001 \\ 101 & 100 & 101 \end{bmatrix}$		option №4
3 – row $\begin{bmatrix} 011 & 011 & 011 \\ 111 & 111 & 111 \end{bmatrix}$		option №5

Definition: 0 - upper needle; 1 - lower needle; 11 - a loop is formed on the needle; 00 - the thread is not laid on the needles, passage; 011 - a loop is formed on the upper needle; 111 - a loop is formed on the lower needle, 001 - the upper needle, the thread guide is changed; 000 - no thread is laid on the upper needles, passage; 100 - no thread is laid on the lower needles, pass.

IV. Conclusions

1. The basic requirements for the construction of a universal matrix coding system (UMC) of the structure of knitwear of any curly weaves have been determined.
2. A record of the matrix coding of the graphic record of the knitwear of the basic and weft weaves has been constructed.

References

1. Мотанов В.Г, Кудрявин Л.А. Универсальная матричная система кодирования кулирного трикотажа для систем автоматизированного проектирования. «Текстильная промышленность», №2, 1987 г., с 157.