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## **RESEARCH OF PARAMETERS OF STRUCTURE OF JACQUARD FABRICS**

**Abstract.** *In this study, the structural parameters of jacquard fabrics were studied. The height of the bending wave of the warp threads and weft, weft for jacquard fabric of the main weaves with short, medium and long overlap are determined depending on the coefficient determining the height of the bending waves. It has been found that in jacquard fabric during the transition of weaves from long floors to short floors: the maximum density on the base and on the weft decreases; the geometric density at the base and on the weft increases; the height of the bending wave of threads along the warp and weft remains unchanged.*

**Keywords:** *fabric, weave, overlap, density, filling.*

### **Introduction**

The density of the fabric on the basis and the weft, and their ratio has a great influence on the structure and properties of the tissues. The density of the fabric on the basis and on the weft depends on the diameter of the threads and on the type of weaving in the fabric. The maximum density of a fabric with a short overlap of plain weave is less important than any other weave of threads with a medium and long overlap in the fabric (derivatives of plain weave, twill, satin weave and derivatives thereof). The type of weave has a great influence on the structure and properties of the fabric. In particular, plain weave fabrics (with short overlapping) have a greater breaking load and a warp of weft and warp threads than fabrics of other types of weaves (medium and long overlaps), while fabric production (short overlaps) is accompanied with great tension [1].

Table 1 – The values of geometric and maximum densities on the basis and weft for jacquard fabric of fundamental weaves with long overlapping (1/3).

The order of the phase structure of the fabric	Coefficient determining the height of bending waves		The height of the bending waves, mm		Geometrical density, mm.		Maximum density, thread / dm.	
	by basis $K_{ho}$	by weft $K_{hy}$	by basis $h_o$	by weft $h_y$	by basis $l_o$	by weft $l_y$	by basis $P'_o$	by weft $P'_y$
Marginal	0,27	1,73	0,069	0,445	0,383	0,257	261	389
III	0,5	1,5	0,128	0,386	0,378	0,298	265	336
IV	0,75	1,25	0,193	0,321	0,367	0,329	273	304
V	1	1	0,257	0,257	0,351	0,351	285	285
VI	1,25	0,75	0,321	0,193	0,329	0,367	304	273
VII	1,5	0,5	0,386	0,128	0,298	0,378	336	265
Marginal	1,73	0,27	0,445	0,069	0,257	0,383	389	261

### Material and methods

The task was to study the parameters of the structure of jacquard fabric when it was developed on a loom, based on fundamental weaves. Since jacquard fabrics with in the rapport for fundamental weaves have short (1/1), medium (1/2) and long overlaps (1/3), it should be expected that the threads have different stress states as during the formation of fabric on the weaving the machine, and after removing the fabric from the machine. For jacquard fabric in the pattern of weaving with short, medium and long overlap, linear density of warp and weft threads  $TO = TU = 25 \times 2$  tex, depending on the coefficient determining the height of the bending waves, the height of the bending wave of warp and weft threads, the maximum and geometric density of the fabric on the basis and on the weft [2, 3].

Tables 1 – 3 show the effect on the geometric and maximum densities of the warp and weft for the fabric with variable rapport of the warp and weft in the fabric, that is, weaves with short, medium and long overlaps.

Table 2 – The values of geometric and maximum densities on the basis and weft for jacquard fabric of fundamental weaves with average overlapping (1/2).

The order of the phase structure of the fabric	Coefficient determining the height of bending waves		The height of the bending waves, mm		Geometrical density, mm.		Maximum density, thread / dm.	
	by basis $K_{ho}$	by weft $K_{hy}$	by basis $h_o$	by weft $h_y$	by basis $l_o$	by weft $l_y$	by basis $P'_o$	by weft $P'_y$
Marginal	0,27	1,73	0,069	0,445	0,425	0,257	253	389
III	0,5	1,5	0,128	0,386	0,418	0,312	239	321
IV	0,75	1,25	0,193	0,321	0,403	0,353	248	283
V	1	1	0,257	0,257	0,382	0,382	262	262
VI	1,25	0,75	0,321	0,193	0,353	0,403	283	248
VII	1,5	0,5	0,386	0,128	0,312	0,418	321	239
Marginal	1,73	0,27	0,445	0,069	0,257	0,425	389	253

## Results and discussion

The analysis of table 1 – 3 shows that when jacquard fabric is developed during the transition of weaves from long floors to short floors: the maximum density on the basis and on the weft decreases; geometric density at the base and at the weft increases; the wave height of the bending of the threads on the warp and weft remains unchanged.

Fabrics with a maximum density of  $P'o$  and  $P'y$  for both systems of threads to produce on a weaving machine is almost impossible. Therefore, the production of tissues with a lower (actual) density of  $P_o$  and  $P'y$  is performed on both systems of warp and weft threads. The ratio of the actual density of  $P_o$  and  $P'y$  to the maximum density of  $P'o$  and  $P'y$  is characterized by filling the fabric with fibrous material and is determined by the following ratio:

for warp threads  $KHo = P_o / P'o$  (1);

for weft threads  $KHy = P_y / P'y$  (2);

for fabrics  $Ktk = KHo \cdot KHy$  (3).

Table 3 – The values of geometric and maximum densities on the basis and weft for jacquard fabric of fundamental weaves with short overlaps (1/1)

The order of the phase structure of the fabric	Coefficient determining the height of bending waves		The height of the bending waves, mm		Geometrical density, mm.		Maximum density, thread / dm.	
	by basis $K_{ho}$	by weft $K_{hy}$	by basis $h_o$	by weft $h_y$	by basis $l_o$	by weft $l_y$	by basis $P'_o$	by weft $P'_y$
Marginal	0,27	1,73	0,069	0,445	0,509	0,257	197	389
III	0,5	1,5	0,128	0,386	0,498	0,339	205	295
IV	0,75	1,25	0,193	0,321	0,476	0,401	210	249
V	1	1	0,257	0,257	0,445	0,445	225	225
VI	1,25	0,75	0,321	0,193	0,401	0,476	249	210
VII	1,5	0,5	0,386	0,128	0,339	0,498	295	205
Marginal	1,73	0,27	0,445	0,069	0,257	0,509	389	197

The filling factor of the fibrous material takes into account the density of the fabric, the linear density of the threads, and the type of overlap of one system of threads of another system of threads in the report, weaving of the fabric. The fill factor of the fibrous material indicates the tension of the fabric on the weaving machine. The closer the filling coefficient is closer to unity  $Ktk < 1$ , the more intense is the production of fabric on a loom [4, 5].

For jacquard fabric in a repeat pattern of weaving with short, medium and long overlappings, linear density of warp and weft  $TO = TU = 25 \times 2$  tex, actual density of  $P_o$  and  $P_u$  equal to 200 filament / dm. we will calculate the fill factor of the fibrous material and present the results in table 4.

Table 4 – Influence of the type of tissue overlap on the fill factor

№	Type of overlap fabric	Weave pattern		Coefficient filling		
		By basis $R_o$	by weft $R_y$	By basis $K_{Ho}$	by weft $K_{Hy}$	fabric $K_T$
1	long overlap fabrics	4	4	0,70	0,70	0,49
2	medium overlap fabrics	3	3	0,76	0,76	0,58
3	short overlap fabrics	2	2	0,89	0,89	0,79

The analysis of table 4 shows that when changing the type of overlap of the fabric, the coefficient of filling with fibrous material is different. The most intense process of fabric production on a loom occurs on a site of fabric with short overlapping, since the index of the coefficient of filling with fibrous material is closest to unity.

### Conclusions

1. When jacquard fabric is developed during the transition of weaves from long ceilings to short ceilings: the maximum density on the basis and on the weft decreases geometric density at the base and at the weft increases; the wave height of the bending of the threads on the warp and weft remains unchanged.

2. The intensity of the process of producing jacquard fabric on a loom in a section with short overlaps is higher relative to a section of fabric with medium and long overlaps.

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## ЖАККАРД ТІНДЕРІ ҚҰРЫЛЫМЫНЫҢ ПАРАМЕТРЛЕРІН ЗЕРТТЕУ

**Аңдатпа.** Бұл мақалада жаккард матаның құрылымдық параметрлері зерттелді. Негізгі жіптердің иілу толқынының биіктігі және қысқа, орташа және ұзын қабаттасуы бар негізгі тоқымалардың жаккард матасына арналған үйрек, үйрек иілу толқындарының биіктігін анықтайтын коэффициентке байланысты анықталады. Жаккард матасында тоқу ұзын қабаттардан қысқа қабаттарға ауысқан кезде анықталды: негіздегі және Үйректегі максималды тығыздық азаяды; негіздегі және үйректегі геометриялық тығыздық артады.

**Түйін сөздер:** мата, тоқу, қабаттасу, тығыздық, толтырғыш.

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## ИССЛЕДОВАНИЕ ПАРАМЕТРОВ СТРУКТУРЫ ЖАККАРДОВЫХ ТКАНЕЙ

**Аннотация.** В этой статье были изучены структурные параметры жаккардовых тканей. Высота изгибной волны нитей основы и утка, утка для жаккардовой ткани основных переплетений с коротким, средним и длинным перекрытием определяются в зависимости от коэффициента, определяющего высоту изгибных волн. Обнаружено, что в жаккардовой ткани при переходе переплетений от длинных этажей к коротким этапам: максимальная плотность на основе и на утке уменьшается; геометрическая плотность у основания и на утке увеличивается.

**Ключевые слова:** ткань, переплетение, перекрытие, плотность, наполнение.