eISSN: 2229-3213 pISSN: 2229-3205
The Journal of Applied Science and Social Science
Volume 16,Issue 03 March, 2026

CHANGES OF SINGLE-CYCLE STRETCH DEFORMATION OF KNITTED FABRICS OBTAINED BASED ON MIXING COTTON FIBERS WITH SECONDARY MATERIAL RESOURCES IN DIFFERENT QUANTITIES

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Abstract: in this article mixing machine 15.0% recovered cotton fiber, 20.0% polyester fiber, 65.0% cotton fiber blend, 30.0% recovered cotton fiber, 10.0% polyester fiber, 60.0% cotton fiber blend, 15.0% spinning waste, 20.0% polyester fiber, 65.0% cotton fiber blend and 30.0% spinning waste, 10.0% polyester fiber, 60.0% cotton fiber mixed knitted fabrics were obtained and one-cycle tensile deformation was determined.

Keywords: deformations such as bending, stretching, twisting, etc. appear in fabrics, elastic, elastic and plastic (residual)

1. Introduction

In the garment and knitwear industry, a large amount of waste is generated during the production of fabrics and products. This depends on the product range, the equipment used for weaving the fabric, the type of layout and the organization of work on standardizing the fabrics.

As a result of improper operation of the equipment, due to insufficient care and qualified technical service of the machines, defects such as pattern distortion, loop setting or the appearance of enlarged loops, skewed rows of loops, knitting of loops of the wrong color in jacquard fabrics, pattern alignment displacement, and the formation of combs that cannot be smoothed out on the fabric may appear.

Technological waste and secondary material resources of light industry account for 25% of the world's recycled textile raw materials. These are huge reserves that can be used for the production of products. However, only 10% of this waste is used.

Existing waste processing technologies are accompanied by a significant release of inorganic and organic dust from equipment (nonwovens, coarse fiber, furniture and technical cotton).

As a result, the concentration of textile dust in the production area exceeds the maximum permissible concentrations. Textile dust, which has a high hazard class, causes various diseases and reduces product quality.

The development of improved methods and devices for processing waste from the garment and knitwear industry is of fundamental importance in the issue of maximum use of material and raw materials for the production of consumer goods. The use of raw materials and material resources is a decisive factor in maintaining an ecologically clean environment and reducing fuel and energy resources.

The mechanical properties of knitted fabrics indicate their response to the action of various forces, and these forces are different, they can be large or small, and can act once or repeatedly. Forces can act in the length, width, or at a certain angle to the fabric. As a result, deformations such as bending, stretching, twisting, etc. appear in the fabric.

The total elongation and its parts that occur when the fabric is stretched are included in the one-cycle mechanical properties. The composition of the one-cycle tensile deformation of the fabric is divided into three types: elastic, elastic, and plastic (residual). All parts of the total elongation appear and develop simultaneously with the force acting on the fabric.

The elastic part is formed very quickly and changes the external bonds associated with the elasticity of the fibers in the fabric by a negligible amount.

The elastic part is formed over a certain period of time and under its influence the bonds in the structure of the fabric change and new types of bonds appear.

The plastic part is associated with irreversible changes in the external and internal bonds of the fabric and brings the constituent parts of the fabric into a different structure.

After releasing the force from the fabric, a process called relaxation occurs in them to return to their original state. Elastic elongation disappears when the force is removed.

Elastic elongation gradually disappears after the force is removed, and plastic elongation does not disappear.

The ratio of elastic, elastic and plastic elongations of fabrics depends on their fiber composition and affects their resistance to wrinkling and the ability of the garment to retain its shape. For example, if the fabric contains pure wool or synthetic fibers, then such a fabric will be elastic. If the fabric contains cotton, silk, and wool fibers, then such a fabric will have a greater amount of elastic deformation. If the fabric contains bast fibers, then such a fabric will have a greater amount of plastic (residual) deformation.

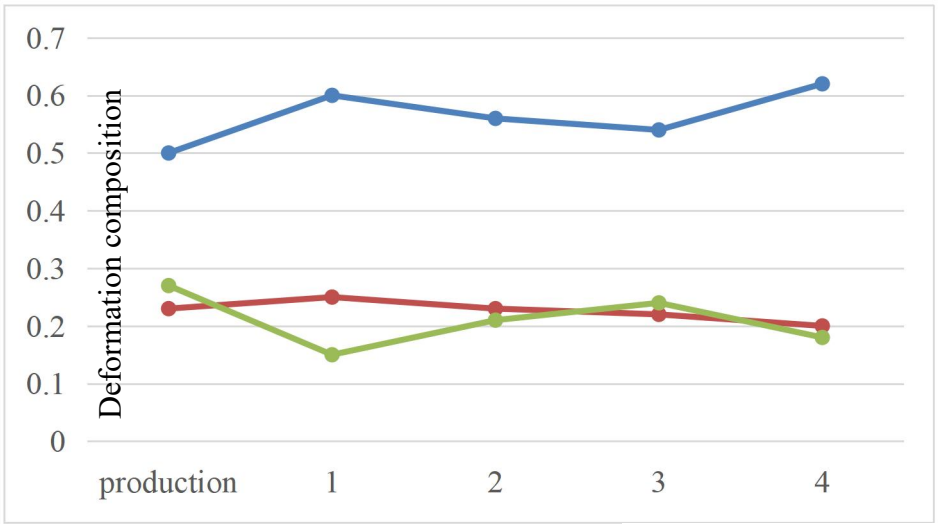
2. Methods

Research was conducted to study the effect of mixtures of various compositions and recycled fibers on the one-cycle tensile deformation of fabrics. For this, the one-cycle tensile deformation of knitted fabrics obtained by mixing cotton and lavsan fibers with recycled fibers was determined, and the test results are presented in Table 1 below.

Table 1

Changes in one-cycle tensile deformation of knitted fabrics obtained by mixing cotton fiber with different amounts of secondary material resources

	Indicators	Fabric obtained from a blend of 30.0% recycled fiber, 70.0% cotton fiber under production conditions	Composition of the mixture,%			
			33.0 % recycled fiber, 67.0% cotton blend fabric	Fabric made from a blend of 16.5% recycled fiber, 16.5% spinning waste, 67.0% cotton fiber	Fabric obtained from a mixture of 33.0% spinning waste, 67.0% cotton fiber	Fabric from a mixture of 16.5% spinning waste, 16.5% polyester fiber, 67.0% cotton fiber
.	Strap deformation	0,50	0,60	0,56	0,54	0,62
.	Elastic deformation	0,23	0,25	0,23	0,22	0,20
.	Residual (plastic) deformation	0,27	0,15	0,21	0,24	0,18



1- strap deformation; 2- elastic deformation; 3- residual (plastic) deformation.

Figure 1. Changes in one-cycle tensile deformation of knitted fabrics obtained by mixing cotton and lavsan fibers into recycled fibers.

3. Results

Comparing the test results with the parameters of the knitted fabric obtained under production conditions, the elastic deformation of the knitted fabric obtained by mixing 100% cotton fiber with 33.0% recovered fiber, 67.0% cotton fiber mixture increased by 16.7%, elastic deformation increased by 8.0%, residual (plastic) deformation decreased by 44.4%, 16.5% recovered fiber, The elastic deformation of knitted fabric obtained by mixing 100% cotton fiber with 16.5% spinning waste, 67.0% cotton fiber mixture increased by 10.7%, the elastic deformation did not change, the residual (plastic) deformation decreased by 22.2%, obtained by mixing 100% cotton fiber with 33.0% spinning waste, 67.0% cotton fiber mixture of knitted fabric belt deformation increased by 7.4%, elastic deformation by 4.3%, residual (plastic) deformation decreased by 11.1%, 16.5% spinning waste, 16.5% polyester fibers, 67.0% cotton fibers mixed with 100% cotton fibers, the belt deformation of knitted fabric increased by 19.4%, elastic deformation by 13.0% ha, the residual (plastic) deformation decreased by 33.3%.

4. Conclusion

According to the test results obtained from the determination of the deformation properties of knitted fabrics, compared to the parameters of the knitted fabric obtained under production conditions, it was found that the elastic deformation increased from 7.4% to 16.7%, the elastic deformation increased from 4.3% to 13.0%, and the residual (plastic) deformation decreased from 11.1% to 44.4%.

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