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Mathematical Modeling of Terry Tissues Based on Physical and Mechanical Indicators

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Annotation: This article involves building a mathematical model using a statistical analysis method based on the results of experimental analysis of capillary properties in the fields of air conductivity, water absorption and drying, tandem and archetypal threads from basic physical properties. Experiments from multi-factor planning in mathematical modeling of the physical properties of Terry's objects have resulted in the use of a method of determining the regression model, and the model created has been used to analyze the effects of hairy objects on physical properties for changes in hair length and fiber size.

Keywords: Terry, hairy towel, hair length, fiber, cotton, polypropylene, air conductivity, water vapor conductivity, liquid transfer speed.

Introduction: In the production of any product, the main factor is the development of items that meet the demand for quality consumption using the available raw materials correctly. Feathered tissue is one of the most widely used textile products in everyday life. Users prefer that ready-made carpets and towels be convenient and fresh, made of lightweight and soft structures, remain dry as they quickly pass the water and sweat accumulated in the body, and be in hygienic and natural form. Due to squirrel, in water-related cases for textiles, Terry is an important necessity for fabrics and the physical properties of towel fabrics should be unique.

Hairy texture fabrics should have high compaction and softness characteristics. These features are necessary to improve mechanical comfort and appearance. It is important that the water absorbs water for fabrics used to dry the surface or quickly pass water through a wet surface. If the wet surface belongs to human skin, fabrics used for water transfers should provide mechanical comfort and have the ability to absorb water. Looking at the above requirements, cotton fiber is one of the most promising material for the manufacture of such a fabric. Threads produced using cotton fiber give good ingestion properties. Textile technologists have done a lot of research to optimize thread structures to achieve greater water abscess, and later to test engineering modification in fabric structures and fabrics fabrics that are fabricated. The main technologies used in these developments were to increase the tips of free-moving threads, or hair nests, on the fabric surface.

Today's production, like other industrial products, is based on the textile market, where quality plays the most important role in accepting any product. In the textile test, production and their manuals have undergone substantial changes in the last few decades. The performance of the fabric can be evaluated in two ways. One of them is such useful indicators as strength, color resistance, resistance to contraction, etc. In addition, consumer attention is focused on such high levels of effectiveness factors as improved quality in terms of appearance and accessibility. Fabrics are considered an unqualified product, as they lose their functionality and aesthetic charm. Evaluation of most useful parameters is carried out with the help of well-installed equipment and standard sequences. However, evaluating the quality of the fabric from the point of view of their functionality and aesthetic attractiveness is more difficult than assessing useful performance.

The characteristics of the feathered towel fabric depend not only on its raw material, but also on its structure. There are also some other factors that need to be studied to study the effects of feathered towel fabrics on frictional and compression properties, such as surface properties, the geometry of feathers, the direction of hair, the length of hair, the hair density, the angle of turning of the hair thread, and the forms of intersection with the base.

In addition to the feathered towel, which can be used as a towel, there are other fabrics. The main task of these fabrics is to absorb a large amount of water. Fabrics made using high water-sweeping fibers, threads

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and weaving structure can be described as towel fabrics. Fibers used in these fabrics have a hydrophilic properties and a high level of water ingress.

The research work was carried out to verify the suitability of image processing techniques to objectively assess the structure and appearance of the feathered towel fabric. In addition, the thread and fabric parameters are aimed at studying how a feathered towel affects the structure and appearance of the fabric. Their findings can help the manufacturer produce fabrics with the best textures and appearance. As a result of the foregoing, this research focuses on an objective assessment of feathered fabrics from the point of view of the geometric properties of the fabric, surface properties, dust absorption, aesthetic properties and suitability for use.

The study classified cost elements according to the characteristics of being constant and variable, and conducted current production cost calculations for the selected fabric type, cost size analysis for different towel models. At the starting point of the models, the amount of production and the amount of fabric produced are calculated if a certain profit is aimed.

The study assessed the severity of softness, hydrophilia and feathered fabrics. Accordingly, it was obtained as a result of the tests performed. Three measurements were conducted for each towel, and their average arithmetic values were determined and included in the table. As it turns out, the softness level of towels used as samples was from 0.62 to 7.80 kgk. At the same time, a total of 50 towels were used as samples in his study, and 40 of them tested for softness.

Using the information entered into the program, we define regression equations at each rate.

Determination of surface density of feathered tissue

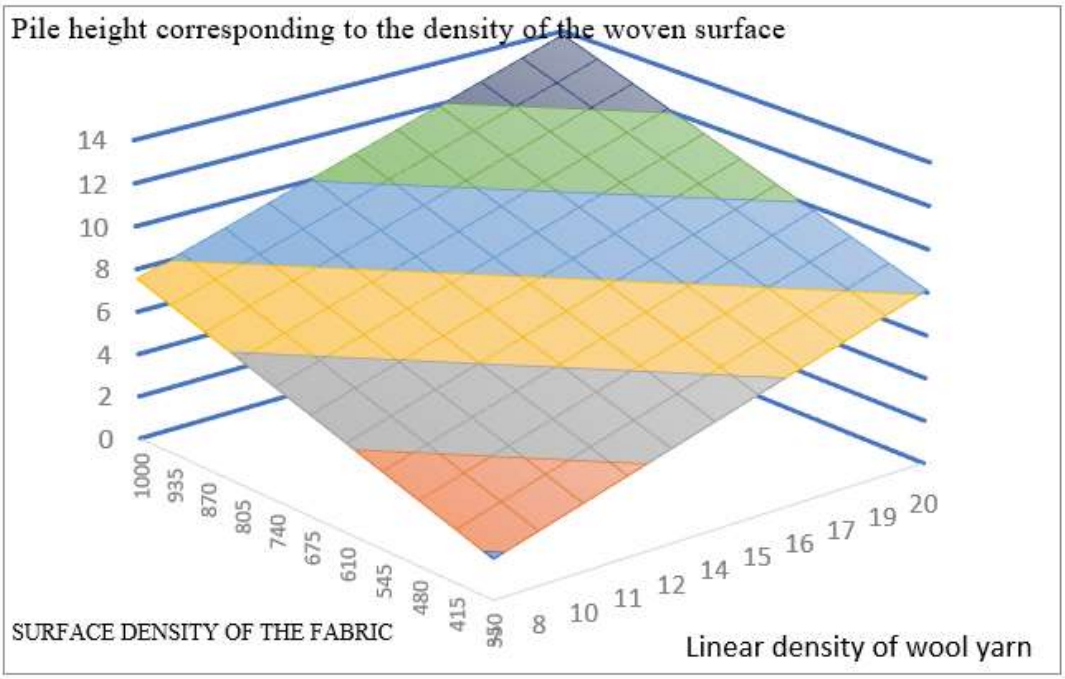
M=-25,476*NTU+10,407*NT-5,991*NA+3,464*SA +8,545*ST+46,1*BT

R=1,000 R2=0.999 R2d=0,999

The above equation shows that if all other factor variables are constantly maintained, an increase of 1 unit at the linear density of the NTU-tuk thread will result in a decrease of 25,476 units in the product surface density.

Determining the height of the hair that corresponds to the density of the larynk surface

BT=-4,587+0,481*NTU+0,008783*M



1-fig. Determine the height of the hair that matches the density of the throat surface

Determination of the density of tissue by tandem thread:

ST=1,047*NTU+0,990*NT+0,688*NA+0,02806*M

R=0.998 R2=0.996 R2d=0.996

Determination of density of tissue by archetypal thread

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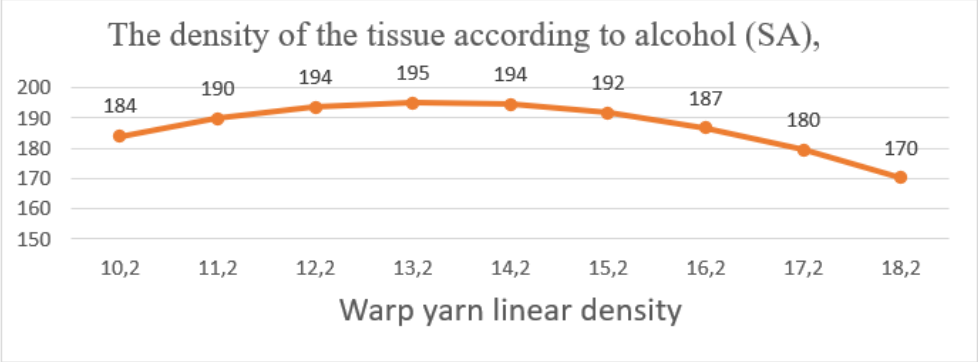
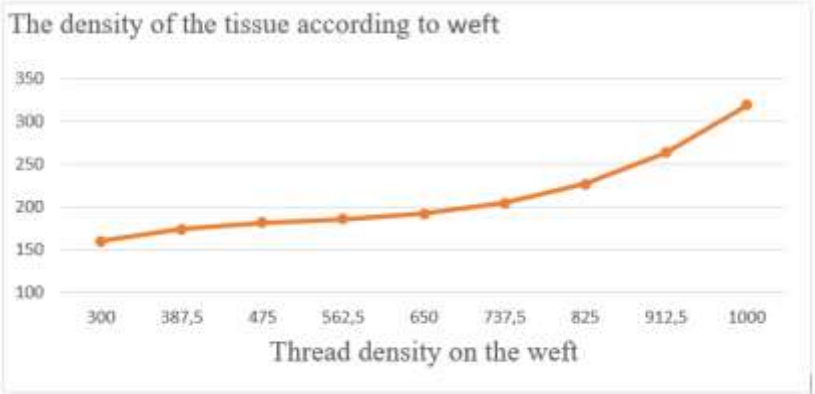
SA=5,821797*NA-0,217071*NA^2



2-fig. Determine the density of the cord thread by the arrow of the appropriate tissue

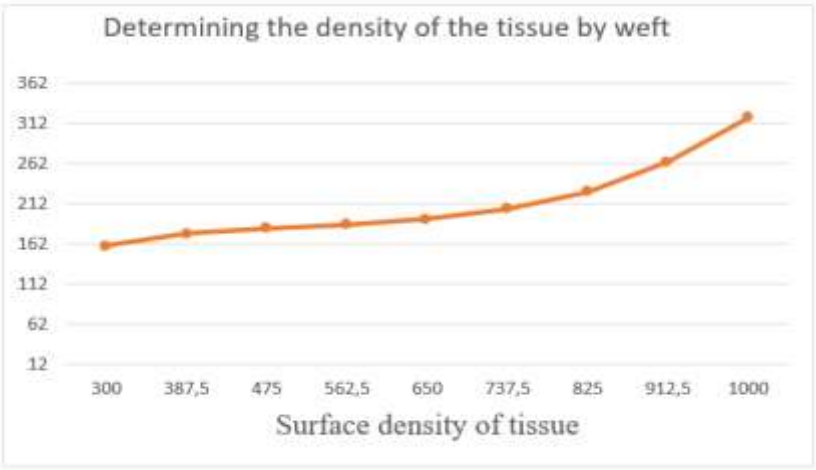


3-fig. Analysis of the density of the tissue by tandem thread linear and arrow thread

The direction of the threads used in the tissue affects the bending of three system threads and the change in the length of the bend.

SA=0,188568*M-0,000337*M^2+2,122*10-7*M^3

R=0.998 R2=0.997 R2d=0.997



4-fig. Determination of the density of the tissue by the corresponding cord thread of the surface density of the tissue

Determine the amount of shrinkage of the rope on the bend

KA=-0,00817*M+0,432*ST R=0.997 R2=0.995 R2d=0.995

In total, 6 nonlinear optimization models were created in the study, 2 of which were single-purpose and the rest of the multi-purpose, based on the product identification model as the main model.

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