

RELATIONSHIP BETWEEN MATURITY DEGREE AND SHAPE OF FIBRE FRACTURE OF COTTON IN FUZZY SETS THEORY APPROACH

Ewa Sarna, Andrzej Włochowicz, Marian Sarna
Institute of Engineering Textiles and Polymer Materials
University of Bielsko Biala
Willowa 2, 43-309 Bielsko Biala, Poland
E-mail: esarna@ath.bielsko.pl

KEY WORDS: scanning electron microscopy, cotton fibre fracture, fuzzy relation

1. Introduction

Maturity degree of the cotton is a parameter, which have great meaning during an estimation of physical propriety of cottons [1,2]. This property have great significance in converting from raw cotton to yarn. Mostly applied method for determination maturity degree of cotton is comparative method with " Soviet - standards" [3].

2. Research methods.

Determination of maturity degree by "Soviet – standards" method demands visual comparisons of appearance of fibre on 1cm along with "Soviet – standards". Comparison this is burdened in large scale of subjective factor, therefore is so not ambiguous. Attributing the maturity degree for given fibres is so procedure not entirely univocal.

In the paper has been undertaken an attempt of finding relationship among maturity degree of raw cotton with shape of image of fibre fracture.

The image of cotton fibre fracture has been received with the use of scanning electron microscope (JSM 5500LV firms JEOL).

3. Results.

In the investigated matter it has been distinguished three classes of fracture: plastic, elastic - plastic and elastic. In these classes of fracture it has been executed further details of microstructure and consequently distinguished 14 different qualitatively subclasses of areas.

Classifying of cotton fracture received by SEM method to one of subclasses is not entirely univocal, because burdened is subjective factor visual estimation.

For description of phenomenon and processes in which qualifying of features occurs blurred has been introduced by L. A. Zadeh [4] fuzzy sets theory. Numerous applications of fuzzy sets theory already ten years later, confirm her usefulness in technique and sciences [5].

4. Conclusions.

In the fact of ambiguity in determination of maturity degree with "Soviet – standards", and proposed here SEM method too, one undertook attempt to apply a methods of fuzzy theory for description of cotton maturity.

Literature:

1. E.Sarna, A. Włochowicz: "The influence of the Spining Process on the Supermolecular and Morphological Structure of Cotton"; in *"Proc 26th International Cotton Conference"*, Bremen, Germany, March 13-16, 2002, pp. 223-238.
2. E. Sarna: Thesis, Bielsko Biala 7.06.2004, Poland
3. *Polska Norma PN – 72/P-04675*; "Metody badania surowców włókienniczych. Bawełna".
4. L.A. Zadeh : "Fuzzy sets", *Information and Control*, Vol. 8, no 3, June 1965
5. Ed. By M.H. Gupta: Advances in Fuzzy Sets Theory and Applications, North –Holand Publishing Company, Amsterdam –New York –Oxford, 1979