THE IMPORTANCE OF COTTON CRYSTALLITE ORIENTATION ANGLE IN EVALUATION OF BUNDLE AND/OR YARN TENSILE PROPERTIES

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Abstract

Previous work (1) has shown that the Angle of the 50% X-ray Intensity 002 diffraction arc of cotton fibers is most important in evaluating yarn and bundle tensile properties of different cottons. When bundle and yarn tensile properties are considered separately, the importance of the 50% X-ray angle continues in simple or multiple correlations with other fiber properties is great, (i.e., very highly correlated with bundle and yarn tensile properties). When multiple correlations are made between yarn and bundle tensile properties in conjunction with other fiber properties, the statistical significance of the 50% X-ray angle of cotton fibers cannot be determined because it is related to both the independent and dependent variables. This is known as statistical collinearity.

Sief *et al* (2) reported Stelometer and HVI bundle and MANTIS single fiber tensile data as well as AFIS, X-ray diffraction, and microscopic fiber data. Collinearity was found between X-ray Angle and AFIS data when related to tensile property data. Each of the three tensile property data sets were evaluated in multiple correlations with X-ray Angle and AFIS data and five microscopic fiber parameters; X-ray Angle was eliminated. Additionally, stepwise multiple correlations with the same three sets of tensile property data were made with the same seven fiber properties and only those fiber properties with statistical significance were retained; an improved evaluation of Stelometer, HVI, and Mantis data resulted.

Although X-ray Angle plays a very important part in yarn, bundle, and single fiber tensile properties, it need not be measured: (1) AFIS measurements can be substituted for it, or (2) a comparison of yarn and bundle tensile data eliminates the need of it.

References

1. De Luca, L. B. and A. P. Thibodeaux. 1994 Beltwide Cotton Conferences, Cotton Quality Measurements Conference, Vol. 3. pg. 1492.

2. Sief, M. G., S. H. M. El-Hariri, M. A. M. Ghorab. 1995 Beltwide Cotton Conferences, Cotton Quality Measurements Conferences, Vol. 2. pp. 1168-1170.

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