ANALYZING AFIS' MATURITY DISTRIBUTIONS OF 104 REFERENCE COTTONS

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Abstract

The objective of this paper is to analyze the AFIS' maturity distributions of the 104 reference cottons, in comparison with the cross-section analysis data from the Fiber Image Analysis System (FIAS). It has been demonstrated that FIAS can provide direct and verifiable maturity measurements on individual fibers. The main findings of this study include:

(1) Except the mean parameter (M_q), the other descriptive parameters, such as standard deviation (SD_q), skewness(S_q) and kurtosis (K_q), of the AFIS and FIAS cotton maturity distributions are not consistent. The AFIS and FIAS M_q values show a moderate correlation. The AFIS SD_q values are smaller (ie, more concentrated) than the FIAS. Most AFIS's maturity distributions have smaller absolute S_q, indicating less skewed distributions. In terms of K_q, AFIS has less negative kurtosis values than FIAS, reflecting less platykurtic (or peaked) distributions.

(2) The paired AFIS and FIAS maturity distribution curves consistently show that AFIS generates much more normally distributed maturity data than FIAS. FIAS has more skewed data, both positively and negatively, than AFIS. For most cottons in the reference set, AFIS shows smaller distributions in both low and high maturity ranges, meaning it underestimates both matured and dead fibers. Some cottons show less left-skewed AFIS maturity distributions, indicating AFIS miss-calculates a large quantity of highly mature fibers.

(3) The immature fiber contents ($0.3<q\leq0.6$) calculated by AFIS and FIAS are both above 50%. In most cottons, AFIS generates lower dead fiber contents ($q\leq0.3$), higher immature fiber contents and lower mature fiber contents ($q>0.6$) than FIAS.