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Quantification of Lustre in Textile Fibers by Image Analysis

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Abstract : A key component of the physical attribute of textile fibers is lustre. It is a complex phenomenon arising from the interaction of light with fibers, yarn and fabrics. It is perceived as the contrast difference between the bright areas (specular reflection) and duller backgrounds (diffused reflection). Lustre of fibers is affected by their surface structure, morphology, cross-section profile as well as the presence of any additives/registrants. Due to complexities in measurements, objective measurements such as gloss meter do not give reproducible quantification of lustre. Other instruments such as SAMBA hair systems are expensive. In light of this, lustre quantification has largely remained subjective, judged visually by experts, but prone to errors. In this development, a physics-based approach was conceptualized and demonstrated. We have developed an image analysis based technique to quantify visually observed differences in lustre of fibers. Cellulosic fibers, produced with different approaches, with visually different levels of lustre were photographed under controlled optics. These images were subsequently analyzed using a configured software system. The ratio of Intensity of light from bright (specular reflection) and dull (diffused reflection) areas was used to numerically represent lustre. In the next step, the set of samples that were not visually distinguishable easily were also evaluated by the technique and it was established that quantification of lustre is feasible.

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