Characterization of Cashmere Related to Tactile and Visual Senses

DAVAAJAV NARANTOGTOKH
ダバジャーバ ナラントグトフ

京都工芸繊維大学
Kyoto Institute of Technology
Graduate School of Science and Technology
Department of Advanced Fibro-Science
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ABSTRACT

Woven cashmere fabrics are well known as high-grade luxury fabrics because of their softness, light weight, warmth, and unique luster. In Mongolia, well experienced experts judge the quality of cashmere visually and tactilely. This study aimed to develop a new characterization method for assessing the tactile and visual properties of fine cashmere assemblies. The objective method to simulate the expert's touch was translated as compression and surface properties using KES fabric evaluation testers. Measuring condition and equipment for fiber top was made for this purpose. The softness of fine cashmere tops was characterized under low applied force, as are its compression and surface properties. The compression energy (*WC*) and displacement (D_{max}) at a P_{max} 250Pa were suitable for distinguishing among samples. The mean coefficient of friction (MIU) shows a significant difference ($p<0.05$) among fine cashmere fiber tops. Softness as evaluated by the hand touch of an expert can be differentiated by using the values of compression and MIU in combination. The luster and warmth are important property for cashmere coat fabrics. A surface characterization method was examined to specify the effect of super fine fibers on the luster and warmth of cashmere fabrics. Using a goniospectrophotometer, a high CIELAB L^* was found for rotation angles (θω) around 90°, corresponding to an aligned fiber surface, but not for random fibers. The shape of the plot of L^* versus θω was affected by the degree of hairiness and its direction. By measuring the surface roughness (SMD) with a surface tester, a difference in light reflection between the warp and weft directions was observed according to the hairiness direction. For the transient heat flux (q_{max}) related to the warmth perception, hairier samples showed lower values than did less hairy samples. The fabric surface texture was evaluated as using two methods such as KES surface tester and actual human finger movement. Finger sliding assessment was carried out using the triaxial force plate to obtain the finger force, speed and position of fingers. Coefficient of friction obtained by Tri-axial force plate (CoF) were related to the mean coefficient of friction (MIU). CoF produced by males were consistently larger than those produced by female participants. The findings of this thesis provide the characterization method for fine cashmere fiber assemblies and fabrics which link to a tactile and visual senses of human perception.

Keywords: cashmere, compression, friction, L*, q_{max}, tactile sense, fingertip, Tri-axial force plate