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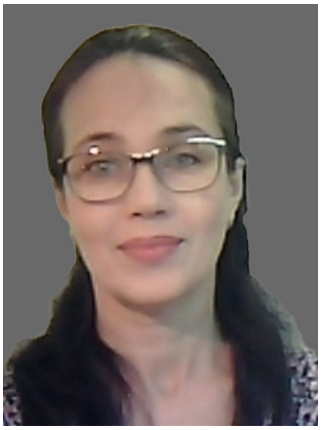

Topic of the Speech:
Assessment of Knitwear Comfort via 3D Modeling and Simulation

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Dr. Tetiana Yelina is an associate professor in Kyiv National University of Technologies and Design, Department of Textile Technology and Design.

Her main research interests include 3D modeling of knitted fabrics and articles, knitwear comfort, manufacturing of textile materials with predetermined properties. She has published more than 40 papers in peer-reviewed national and international journals, presented more than 100 papers at scientific conferences.

ABSTRACT SUBMISSION
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Assessment of Knitwear Comfort via 3D Modeling and Simulation

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ABSTRACT (NO MORE THAN 500 WORDS:)

Wearing comfort of knitwear is mostly determined by the properties, providing thermophysiological and sensory (tactile) ease, which can be attributed to hygienic indicators and anthropometric convenience. Geometric characteristics of internal structure of the knit influence ergonomic quality indicators and thermophysiological comfort of knitted products. Air and water vapour permeability, thermal conductivity depend on what part of the knitted fabric volume is occupied by the material of yarn and by the air, as well as on the geometry of the surface of contact between the yarn and the air. These properties depend on the knitted structure parameters, such as yarn diameter; loop length; wale spacing; course spacing; the thickness of the knit; hairiness and roughness of the yarn surface. Deformation of knitwear during operation changes the yarn geometry and the properties, dependent on it. Providing an accurate geometrical description of yarn configuration in the structure of knit, considering dynamic of its deformation, is one of the key moments of the development a software, suitable for designing knitted fabrics and products with predicted ergonomic properties, which give a feeling of comfort, and meet anthropometric, psychological, and psychophysiological needs of the consumer.

The prospect of the use of 3D modeling and simulation of knitted apparel has been studied for more than 10 years. The use of Computational Fluid Dynamics software for assessment of air permeability and heat transfer is widely discussed in recent publications. The tools of 3D modeling of textile structure are constantly improving. Some issues were successfully resolved, some others remain challenging. One of such quastion is the issue of considering the changing of the yarn geometry under different types of deformation. In this research a deformation model of a knitted tubular part, based on the multi scale approach, has been developed. An algorithm of assessment of knitwear comfort via 3D modeling and simulation based on the use of a three-dimensional model of knitted structure was described. This algorithm allowds creating an open software system, that can be widened by adding new experimental data, containing different characteristics of raw materials and pecularities of different knitted structures.