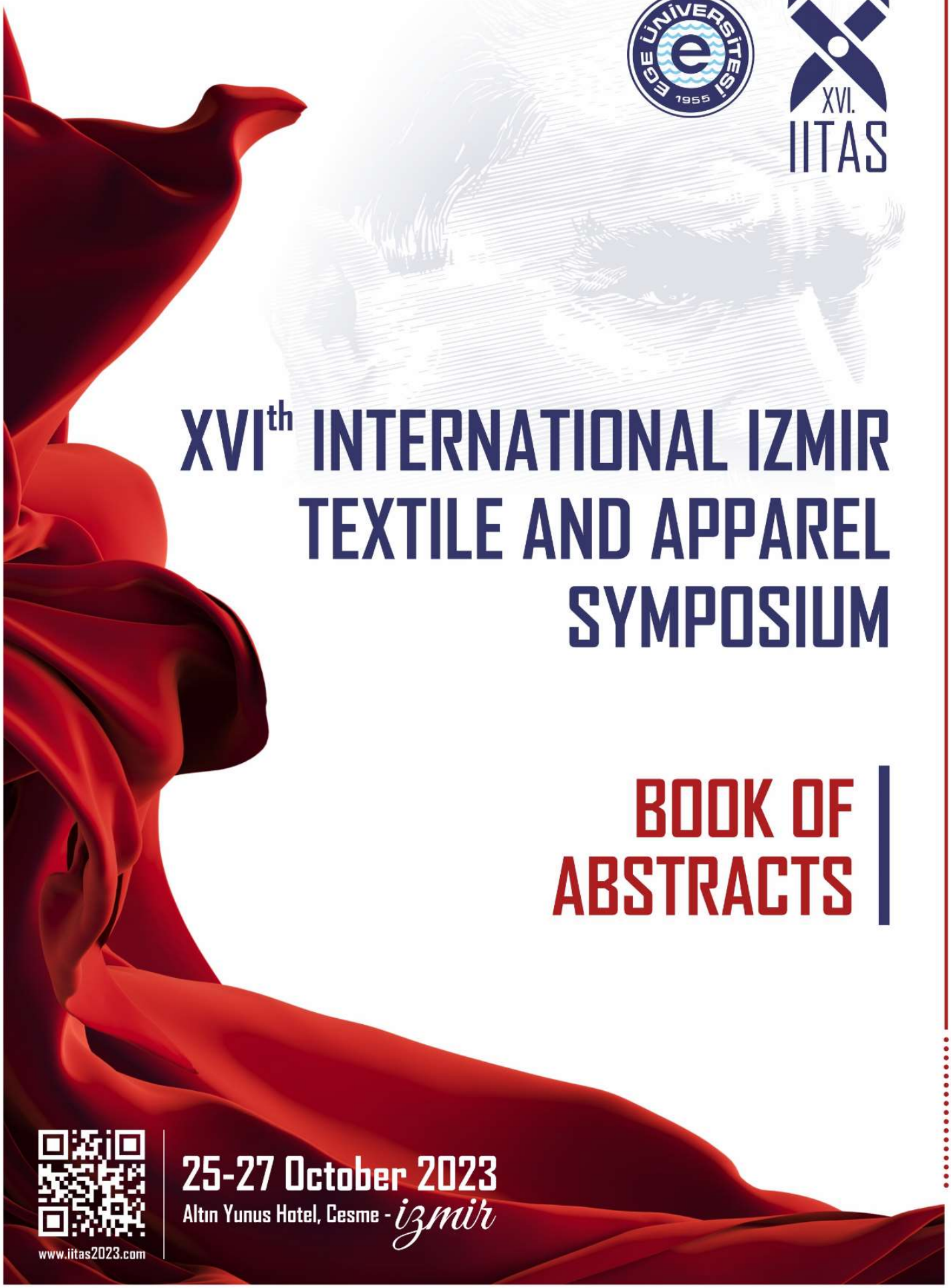

XVIth INTERNATIONAL IZMIR TEXTILE AND APPAREL SYMPOSIUM

BOOK OF ABSTRACTS

25-27 October 2023

Altın Yunus Hotel, Cesme - izmir

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IITAS 2023

OCTOBER 25 - 27, 2023
İZMİR-TÜRKİYE

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IITAS 2023 is organized by Ege University
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XVIth International İzmir Textile & Apparel Symposium
IITAS 2023
ISBN 978-605-338-429-8 (e-book)

THE ADVANCED TECHNOLOGY FOR COMPRESSION GARMENT DESIGN

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Compression garment are skin-tight elastic garment designed to apply pressure to a certain part of the body. It is widely used in professional sports for better performance and recovery after exercise [1], the garments with a slight pressure designed are becoming more popular for body shaping purpose [2]. And of course it have been utilized for medical reasons for many years [3],[4]: in the treatment of burns (scar management), low blood pressure, muscle strains and sprains; to accelerate the healing process and prevent deep vein thrombosis, oedema etc. The compression garment should be made in huge diversity of the sizes and the shapes to follow the body`s contours and to suit different body types and parts. The performance of such product (pressure level and rigidity) depends greatly on end-use and functionality.

The correct adaptation of compression clothes to the individual geometry of the body is an important aspect both compression effect and clothes comfort [5]. Ussually, the appropriate girths and lengths are collected with a measuring tape (for example, for the leg), and then the compression garment is selected according to the compression level and the size table of the current standard [6]. Pre-sized garments available from number of commercial companies in a variety of styles and sizes for all body parts, but they do not normally fit patients perfectly. The scientists around the world are working to improve understanding of the main points of designing compression clothing [7] .

With improvement 3D scanning technology, new approach to design the compression garment was developed based on virtual method [9], which has few stages. The investigation of system “body-compression garments” is the most important one and less studied despite many works in the area [8]. They are mostly focused on flattening of the 3D surface that has ‘‘negative ease’’ compared to the surface of the avatar [9] or/and create the high accuracy model to predict the pressure at the intended points on the human body [10].

The main goal of this research is study the individual geometry of the lower leg and the changes of their sizes and shapes within wearing time of stockings and different activity as well as changes in pressure occurred at the same time. The study focuses on 4D body scanning as tool for high quality personal compression garments development.

The modular photogrammetry based 3D/4D capture and analysis system MOVE 4D at ITM TU Dresden make it possible to capture body movement with frequency 20 frame per sec. The scanning was done for control leg and within stocking wearing at standing position and different activity (Fig. 1). Conventional stocking and two types of compression stockings (I and II classes) were used. The measurements were done between ankle (10 cm from floor) and calf (30 cm from floor). MeshLab and ParaView software was used for data processing, measuring leg sizes changes and comparisons the legs shapes.

The texsens force and pressure measuring device developed by novel.de were used. Measurement time was 60 sec (1 min) with 0.02 sec frequency. The examples of pressure measurement during different activity with conventional stocking are presented in fig. 2.

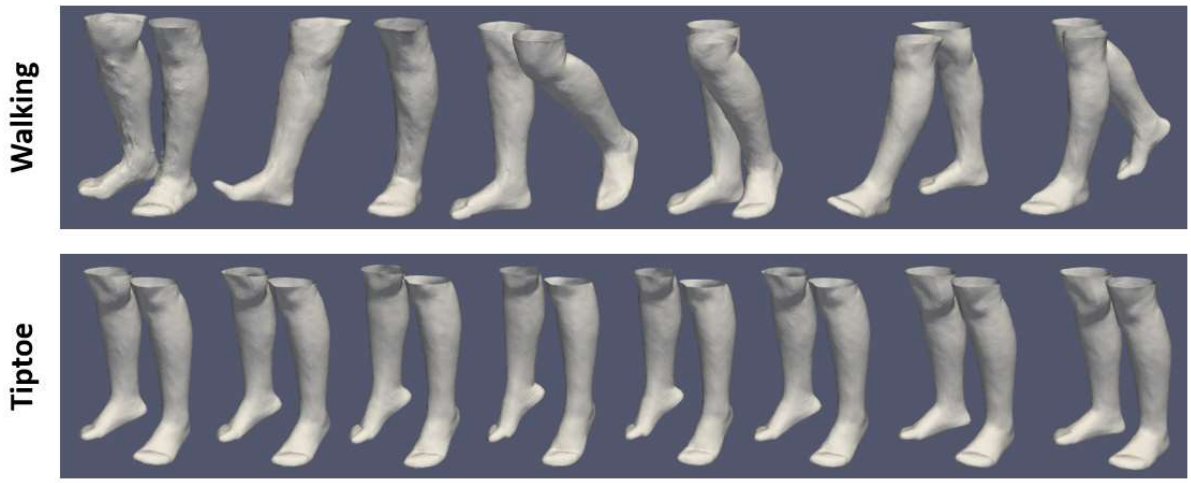

Figure 1. Examples of captions of lower leg during activity

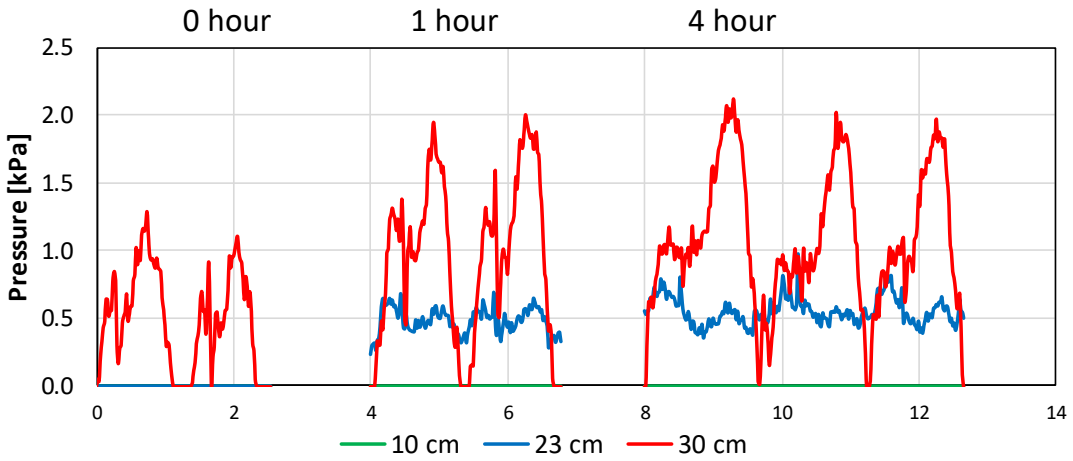

Figure 2. Examples of measurements the pressure by conventional stocking during walking

The research results show that changes in leg size (circumferences and areas) leads to changes in pressure level delivered by stockings. By processing data it was clarified the compression stocking of which class more effective and more useful for scanned person. It could be conclude that the scanning allows the quick estimation the compression stockings functionality.
From the other side, avatar of certain person and the real data of his sizes are the initial point for individual stocking creation and it will be followed by development a tool for high accuracy ready-to-wear compression garments design.

Keywords: 4D body scanning, static and dynamic position, lower leg, body size and shape, compression stocking

ACKNOWLEDGEMENTS
The authors would like to thank Philipp Schwartz Initiative from the Alexander von Humboldt Foundation for Ukrainian scientist for project`s supporting at Technische Universitat Dresden, Germany.

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