Dear submitter,

We are pleased to confirm your abstract submission for IFAB Congress.

Please find below the summary of your submission :

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Main information

Title : Development Of A Methodological Framework Linking The Properties Of Complex Materials To The Mechanical Reaction Of Functional Insoles Used In Podiatry

Keywords: Podiatric insole; finite element method; foam materials; planter pressure

Major references :

Authors

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Your abstract : The design of podiatric insole aims at reducing the maximal pressure under some regions of the foot, especially in the case of diabetic patients. Despite the current evolution of the computer-assisted design, the choice of the materials and their geometries (cut shape, thicknesses) are still empirical, according to the experience of the podiatrist. The Podomat project started to optimize this practice using a coherent database of materials and the adequate material laws to be used for mechanical simulation and for the material and design selection in podiatry. To achieve this, three tasks are set to interact with each other.

The 1st task is the material tensile – compressive curve evaluation for different foams (Ethylene-Vinyl Acetate copolymer, polyurethane, elastomer), which provides the essential non-linear characteristics needed for the mechanical simulation, in addition to the information given from the suppliers such as hardness and density. The second task is pressure maps measurement, which reinforces the understanding of the mechanical interaction between the foot and the insole and confirms the characterization procedure of the material properties. Finally, a finite element simulation of the insole is done in order to predict the new pressure map at the insole-foot interface for different insole candidates.

In the poster, a pipeline of our approach and project concept are presented. The material behavior of EVA and the pressure map on a flat surface from a volunteer's foot are introduced into the FEM simulation. The proposed numerically optimized design has the following two characteristics: high-pressure areas (forefoot and rearfoot area) are hollowed out, in order to reduce peak pressure around 11 % from initial insole and low-pressure area (planter) is expanded to fit the pressure profile.

For future work, more materials properties and pressure maps are needed to enrich the database and improve the simulation reliability.

Sincerely,
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