Empirical Modelling of Elastic Properties of Pressure Garments for Healthcare

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Abstract

The elastic properties of pressure garments are intrinsically related to a number of their mechanical properties and these relationships follow the well known Laplace's equations. Compression therapy is now a well established method in the management of a number of healthcare conditions and it is basically related to blood flow which in turn is related to a number of variables of the pressure garment.

In this research two main applications in healthcare have been investigated: knee braces and pressure garments for the treatment of hypertrophic scars resulting from burns. During this study existing commercial products have been fully analysed and characterised and novel three-dimensional knitted structures with improved properties have been designed, developed and fully characterised. A detailed comparison has been carried out between existing and novel materials and the latter have proven to excel in their mechanical and thermophysiological properties as well as their elastic properties by providing a quasi isotropic behaviour. This is of the utmost importance when the compression is required to be uniform in all directions when applied to the limb.

Empirical models to predict the interface compression level exerted by these novel materials on the human body have been developed and validated through experimentation.

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