LEVERAGING LOW COST BODY MODELS FOR PERSONAL CARE VIRTUAL PRODUCT EVALUATION

Chris Pieper

Kimberly-Clark Corporation

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ABSTRACT

Simulating the human body is complex, and detailed models have been used to describe aspects of its physiology. Examples of applications include simulated crash tests, joint replacements and even a modelling of a beating heart. When evaluating a product interacting with the body, the body may not be the primary analysis objective, but rather is a necessary participant in the simulation. Disposable personal care products, such as absorbent incontinence garments or feminine care offerings, often interact intimately with the body and are intended to fit a range of body sizes and shapes. Virtual evaluations of these products often consider many body sizes and shapes; however, the cost of complex human models for product evaluation can limit the number of use cases considered. Here, cost refers to the price and resource expense of obtaining geometry, creating a finite element definition and the computation of the model. This paper describes techniques used to provide low cost virtual articulated humans suitable for product evaluation.

The advent of faster, simpler yet sufficiently accurate body models allows evaluation of virtual products over more realistic human user populations. This allows personal care product models to put more focus on performance of the product, which is the true goal of virtual product evaluation. By contrast previous capabilities requiring significant computational and body model building resources, resulted in limited testing over a small user population.

The examples featured leverage high quality digital bodies generated by a statistical body model commercialized by BodyLabs, Inc. Using a statistical model (SMPL) to provide high quality virtual human shapes in multiple poses eliminates the effort and challenges associated with converting scan data into a usable finite element model. Further, the simplified approach of defining an articulated skeleton, or other internal features, as collections of nodes rather than as discrete regions provides a means to represent complex internal composition in a computationally efficient manner while maintaining the essence of internal complexity. Another application of a poseable body model eliminates the need to represent much of the internal body altogether. Several examples highlighting the benefits of these techniques are provided to further illustrate the concepts and their advantages.