

Optimization of the Sit-to-Stand Motion

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Abstract

This paper proposes a method to evaluate the influence of moving tracks on body loadings. The sit-to-stand movement is selected and analyzed, in order to illustrate how a special form of physical therapy known as the Alexander Technique can effectively reduce the loads placed on the joints. Because force and moment sensors cannot be implemented to take direct measurements within the joints, we used a motion analysis system to analyze information about body position and then input the data into ADAMS models to estimate the reaction forces and moments on the joints. Furthermore, an optimal control algorithm is introduced to quantitatively identify the optimal contours of the movements. By analyzing the reactions of the joints, this paper demonstrates that better moving tracks are beneficial for reducing body loads.