Modeling and Simulation of Prosthetic Gait Using a 3-D Model of Transtibial Prosthesis [

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Analítica

There are over 10 million amputees in the world, including in Colombia. Amputation below the knee, or transtibial amputation, is extremely common. Due to the physiological changes that affect transtibial amputees, the biomechanics of their gait is altered and may significantly affect their mobility. To determine the dynamic behavior of transtibial amputees and generate knowledge about their biomechanical behavior to facilitate their physical rehabilitation, it was proposed to study prosthetic gait using simulations generated by a computational model. A model of human gait was constructed using Lagrangian analysis to describe the interchange of energy that characterizes this set of movements. In addition, a mathematical model (block diagram) of an active transtibial prostheses was obtained through 3D design using Solidworks software. This model was analyzed in Matlab to simulate the use of the prosthesis. To observe the prosthetic gait, the model of normal gait was altered to replace one of the legs using the model of the prosthesis. The results obtained through this modeling agreed with the results of previous studies with respect to both articular range and spatial-temporal parameters. A kinematic analysis of the model's behavior showed that the prosthesis provides support to the body and allows for an effective gait in the absence of the body part, and the data produced by this analysis of the model's gait pattern correspond to data in the existing literature. In recent years, the usefulness of simulations in the medical context has been observed and verified. This particular simulation should be useful to students who are learning about the biomechanics of prosthetic gait as well as to medical doctors working in this field
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