

Mechanical modeling of motion equations in pole-vaulting and in the hurdles

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Abstract

The present paper is a study regarding the kinematics of movements made by an athlete during a hurdle race by emitting an explosive compulsiveness of biomechanical movements, compulsiveness lining on the psychological support offered to the athlete by the attainment of performance and by his coach's encouragement.

The laws of hurdle kinematics, which are general for all athletes' movements, pursue the tendency to maintain speed at the highest level and to resume it after each pass. These laws have been tested in another discipline also namely pole vaulting. The explosive nature of biomechanical laws, very different from those of the technical mechanism does not allow the simulation of the athletic movements by using robot systems.

In order to simulate these movements multibody system mechanical models as representations of the topology and the geometry of the human body were used. The purpose of the research was the athlete's dynamical identification in order to simulate the mechanical motion of athletic events aiming at the improvement of the athletic performance.

Keywords: modeling, hurdle race, pole-vaulting, athletic performance, multibody kinematics.