

Problems of inverse kinematics regarding the success of the throw in basketball game

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Summary

The paper deals with the problem of motion of human upper limb so that to be ensured the success of the throw in basketball game. For the human upper limb there was considered the model of double pendulum. The classic equation of motion of the ball was correlated with the corresponding equation of motion for the upper limb, so that the ball to pass through the basket. It is well known that the trajectory of a thrown body is a parabola.

The equations of position and velocity of the hand are written and give the initial conditions for the fly of the ball.

Several conditions have to be fulfilled, in order the ball to pass through the basket, such as: the top of the ball's trajectory (parabola) should be higher than the height of the basket, the centre of the basket should be on the trajectory of ball, the projection of the ball's diameter, under the fall angle, on the diameter of the basket, should be smaller than the basket's diameter.

Taking into account these conditions, the parameters of motion of human upper limb are determined, so that to be ensured the success of the throw in basketball game.

The paper can be useful to sportsmen, trainers and researchers in biomechanics in sports, to determine the optimum angles of arm and forearm, personalized for the anthropometrical dimensions of the sportsman, to ensure the success of throw of ball at the basket. Knowing these angles allows adjusting corresponding mobile orthosis for the upper limb, used during training, especially for practicing the throw of ball at the basket.

