Sample report on real-life dynamical system

Technology, Internet

Real time kinematic of volley ball

There is several ways to improve the volley ball serve, that is time spend on air should be reduced. Due to this there won't be any time to react for the opponent team. This will make the opponent team to react faster than the normal one. In this analysis of kinematic of volley ball, the ball spends in air should be reduced, when the serve of volley ball is made.

In order to setup the analysis of kinematic of volley ball, we should consider several variables in the analysis. The schematic diagram will show the top view of volley ball court,

Where

La is considered as the distance from net and the serve location, in the direction of served volley ball.

Lb is considered as the arbitrary distance from where the volley ball lands on the land and the net.

d is the distance from the net beyond the ball lands.

α is the angle of the volley ball makes its side line.

The volley ball trajectory is showed on the schematic diagram, this shows the point where the volley ball lands and serves position.

Where

g = acceleration due to gravity

H = net height

Hmax = ball maximum height

Ho = initial height of ball from the serve position.

V = velocity of volley ball

θ = initial angle of the volley ball

In order to simplify the problem easy, we can ignore the aerodynamics and air resistance on the volley ball. The projectile motion is used and its equation will be,

Where x and y denotes the ball position and t will be time, combine equations 1 and 2 we get,

Equation of parabola in terms of x and y will be given as

Where

The coordinates of point B is (La , H—ho) relative to xyThe coordinates of point C is (La+Lb , -ho) relative xy

Where

The probable equation will be given by

The parameter La, Lb, Lo will used to solve x and y co-ordinates. The initial velocity and initial angle can be given by

The time we have to reduce will be given by

We can minimize the time of volley ball in air by following methods,

- Volley ball must be over the net
- We should make Lb more as much as possible
- We should make Ho more as much as possible

Let us consider the problem based on kinematic of volley ball, we must have the following variables.

d = 9 m

h0 = 3 m

H = 2. 4 m, applying these variables in the above equation we will have the

time of the ball to spend in air, which will be

t = 0. 86 m

This analysis helps us to predict kinematic behavior of the volleyball. A volley ball player can use these three points into volley ball practicing. This will be

- placing the volley ball over the net
- place the volley ball close to the dead line

The time the ball spend on the air does not change when the player serve the ball at cross-court angle. Due to this balls horizontal will change. So, in order to obtain greater speed, greater angle must be used. This is considering as the one of the advantage due to high speed of the ball, opponent team will miss the return short.

Kinematics are very useful for sports and its have broad application on the athletics. Using kinematics in sports will improve the performance and that will increase the chance of winning. Coordination of movements and proper and self-control are one of the key for improving the performance of the athletic person. Understanding the kinematics will help the every athlete to increase his performance.

Kinematics of volleyball – air resistance and Magnus effect

The top spin if the volley ball will reduce the balls air borne time. Due to the top spin on volley will produce the aero dynamic force on the volley ball that will be known as the Magnus effect. The main principle of Magnus effect is it pushes the ball download that help the ball to land faster. The Magnus effect is illustrated in the diagram

The velocity of air around the top of the volley ball will be less than the air velocity in the environment. This is mainly occurring due to the top spin of

the ball. The pressure on the volley ball is high and velocity on the top of the volley ball is less when compare that it to velocity of bottom of the ball. Due to this, net downward force to act on the volley ball. As a result, volley ball air borne time will be reduced by applying top spin on the volley ball, so that the opponent team will face risk in return the volley ball.