

Low Toss Service

What is “Low Toss Service”?

“Low Toss Service” is a service which is performed exactly like a baseball pitch, replacing a baseball with a tennis racket. Hence the elbow of the dominant arm is not going above the shoulder height, and the hand of the dominant arm is not going above the height of the top of the head. No intension is made to hit a tennis ball at the highest point possible.

The advantages are:

- i) easier to swing, because the swing is more natural, (maybe easier to the shoulders too),
- ii) easier to make the maximum “lag”, which provides the better efficiency of the swing, because there’s no need to extend the arm,
- iii) easier to hit a ball, because a ball is much closer to the eyes, and
- iv) easier to toss a ball, because a ball is tossed at lower height.

The disadvantage is what might be caused by a lower height at which a ball make a contact with a racket.

So a natural question can be:

“Is there enough ball clearance over the net, when a ball is hit at a lower height?”

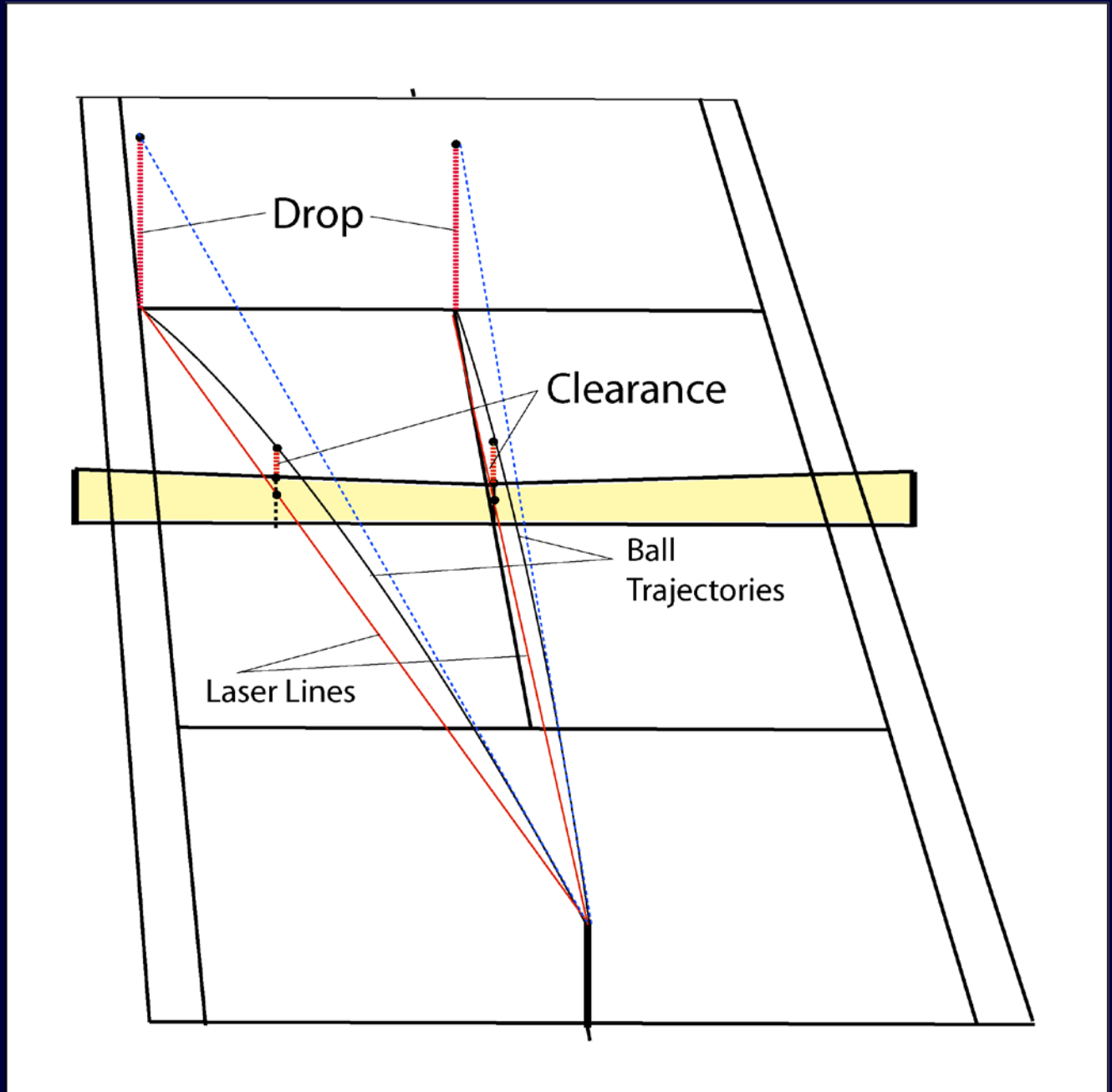


Figure 1. Ball trajectories, clearances, and ball drops

Figure 1 shows ball trajectories, ball clearances at the net and ball drops from tangential lines at the bouncing points of balls. In the following calculation, conditions are:

(1) a ball is hit at a height (of the bottom of a ball) at 7 feet, which corresponds to a situation where a 5 feet tall kid makes low toss services. The trajectory of the bottom of a ball is shown in the figure.

(2) effects of the air drag, or the ball spin (top/slice/under) is not considered. (Balls go through a vacuum. Only the gravity is under consideration.)

(3) balls hit the "T", and the outside corner of the service box. Laser lines are also shown for the reference.

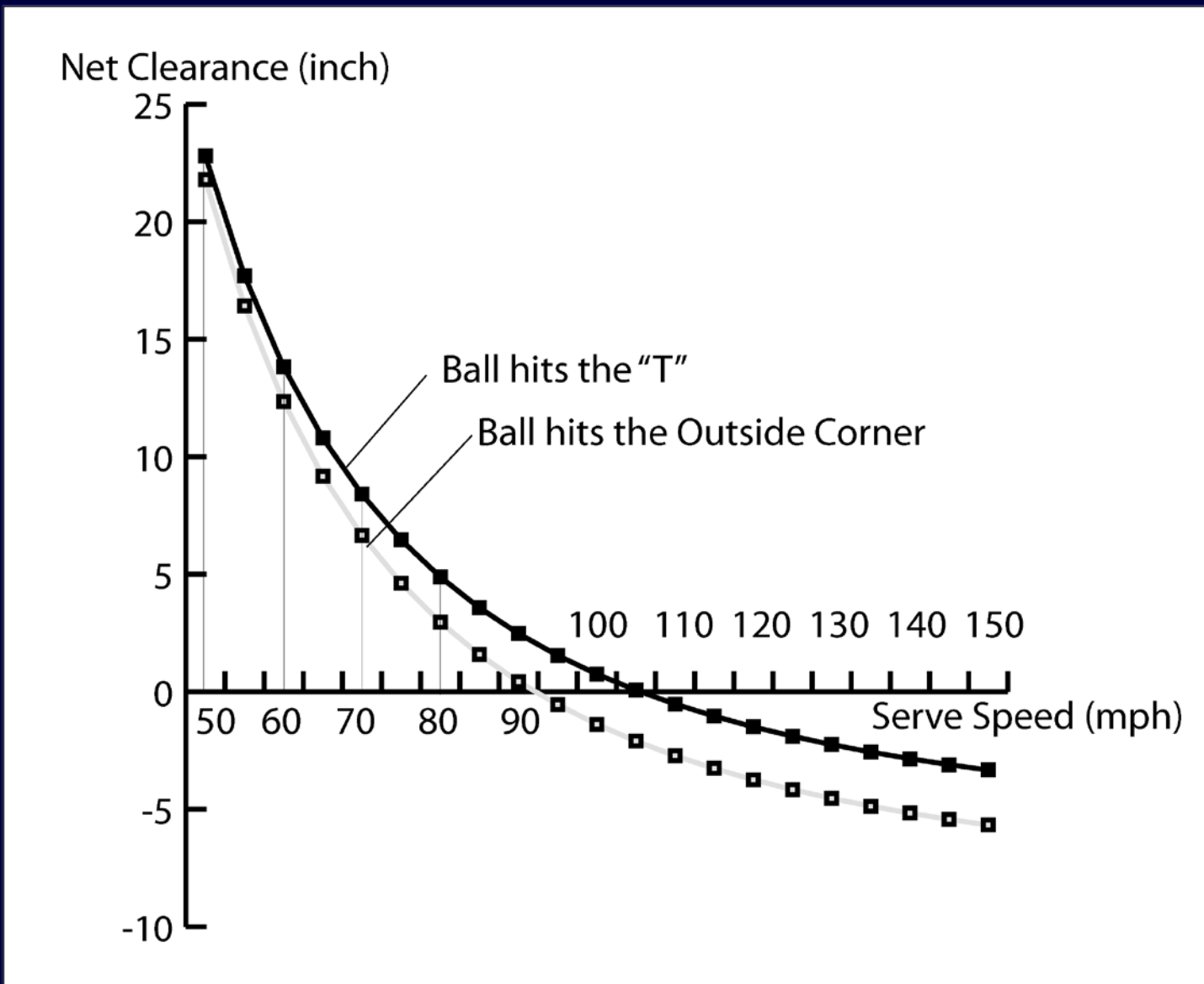


Figure 2. Clearances of balls as a function of initial ball speed, and location of bounce

Ball clearances at the net are shown in Figure 2 as a function of the initial ball speed and the location of ball bounce. Up to 105 mph, a ball has a chance to clear the net when it's aimed at the "T". And up to 90 mph, a ball can clear the net when it's aimed at the outside corner of the service box. With the initial ball speed at 70 mph, the ball clearances are between 5 and 10 inches in the two bouncing spots. When the clearance is negative, a ball hits the net.

Going from ball's hitting the "T" to the outside corner of the service box, the distance increases 2.5%, but the net height increases 7%, which explain the smaller clearance in the case when a ball hits the outside corner of the service box.

Ball drop till its bounce (feet)

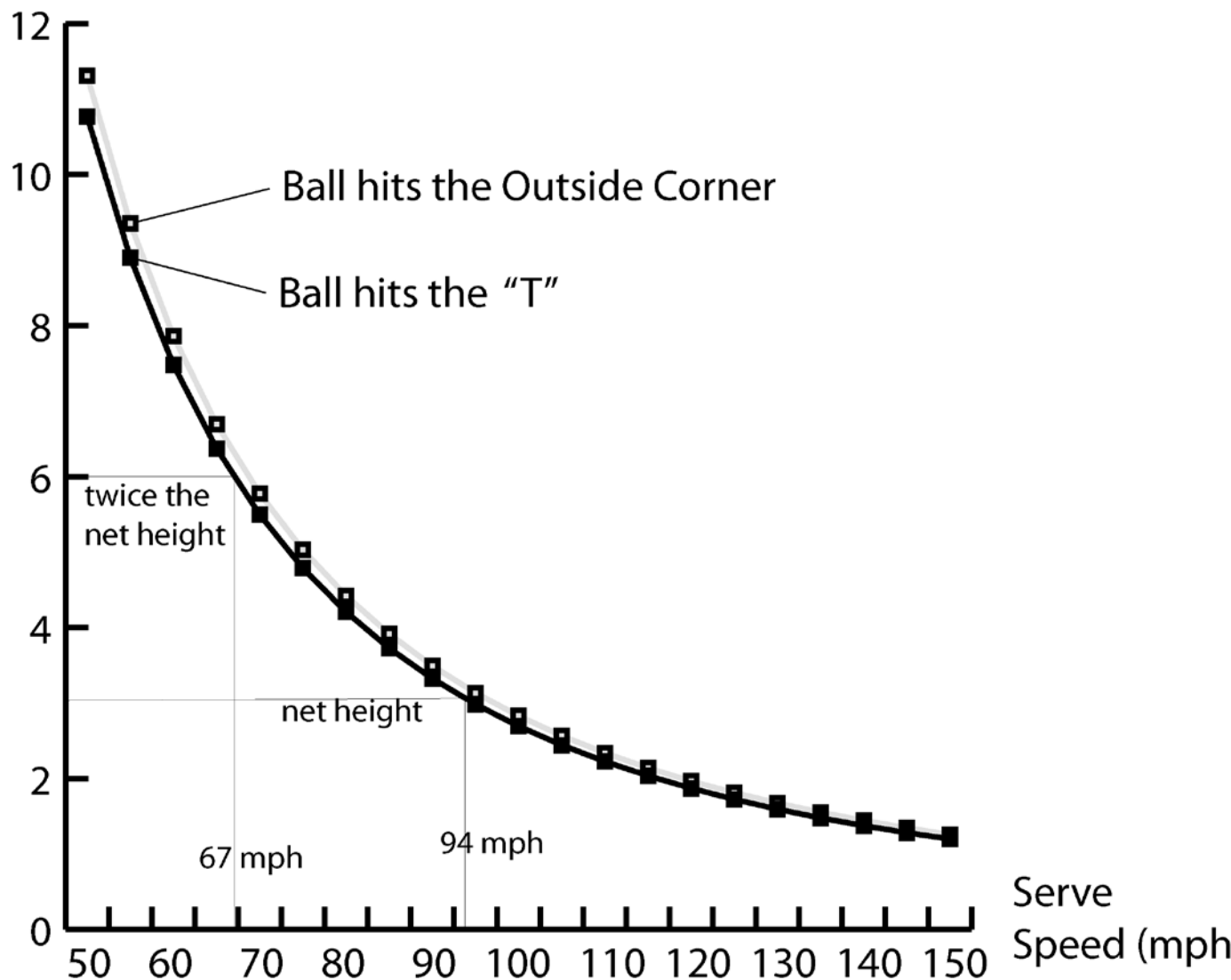


Figure 3. Ball drops from tangential lines of ball trajectories, as function of initial ball speed and location of bounce

The effect of the ball drag through the air (the ball speed goes down) and the effect of ball spins (top/slice/back) are not taken into account in this calculation, but those effects are considered to make both the clearance and the ball drop larger.

With the initial ball speed at 67 mph, a ball drops 6 feet, twice the net height at the center of the net (and this is a little bit counter-intuitive), although the clearance

above the center of the net is around 10 inches (See Figure 2). Even at 94 mph, a ball drops 3 feet, the net height at the center of the net, but the ball clearance is only around 2 inches.