Tennis Ball Colliding with a Wall

Drag the folder ImpulseonTennisBall from the server *University Physics Students/Team Physics 311/Labpro* into *MyDocuments*. Open the folder and open the file *Tennis Ball Impulse.xmbl*. At the bottom of the screen is a video clip of a tennis ball bouncing off a wall. The frames are separated by 0.91 ms.

From the data on the video you can determine the average force on the ball. You must tell the software how big the tennis ball image is in real life. Measure the diameter of a tennis ball in centimeters. Click on the ruler icon, drag across a diameter of the image of the tennis ball, and enter the diameter and units in the pop-up window.

Step through the video and decide what point to track. Rewind and measure the location of the tennis ball in each frame.

The new expression for Newton's Second Law in Chapter 9 is (for the y-component) $F_{ave,y} = \frac{\Delta\pi_{\psi}}{\Delta\tau}$.

Use the data you have collected to find the average force on the tennis ball. Submit a one page report explaining clearly what your measurements were. Print out the graph and attach to the report.

Technical Note: This was not really a video, but a series of photos taken with a strobe light flashing. To avoid double exposing the film, the film was moved sideways between flashes. Thus the ball appears to move diagonally, while in fact it moved vertically.