

Video analysis of motion: using TRACKER

1. Calibration of movement

Stick two strips of tape on the wall in front of which you will drop the ball.
Measure the distance between these strips and memorize it.

2. Processing the results using video analysis

2.1. Start the TRACKER program

Download this program via <http://www.cabrillo.edu/~dbrown/tracker/>




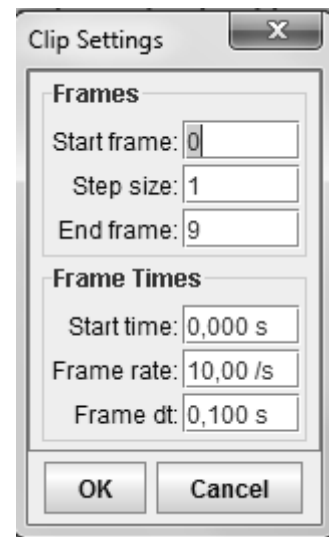
2.2. Open a video or tracker file

Click on IMPORT under PIG. Find your video on your desktop and open it in the program.


2.3. Select the frames that you wish to analyze

Find a good starting point of your video and click on the pause button.

Click on  and enter the number of the frame you have reached. This number you will find at the bottom left of your screen. Search for an end point in the same way. (It also works with the black triangles at the bottom of the screen.)




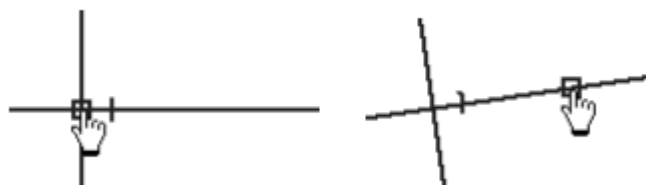
2.4. Calibrate the video

Click  to enter a calibration stick. Place the starting and end points of the calibration stick on the ruler on your video and type in the correct length (e.g. 0,3 for 30 cm). Use a "comma" as a decimal character. Enter the values in meters.




2.5. Enter a coordinate system

Then click  to enter a coordinate system. You can drag the origin and twist the axes.



2.6. Measure the path of an object

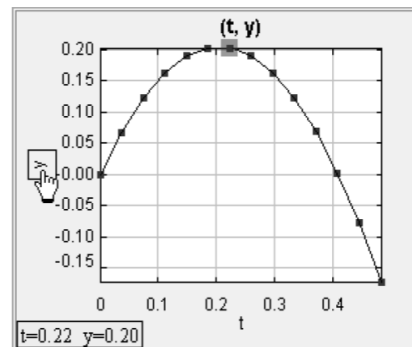
When you have done all of this, click  and choose Point Mass and then Mass A. If you now press the shift button and click on the position of the object that is moving, this place is indicated with a coloured diamond. This way you jump further and further to the next frame, each time clicking on the position. Note: do not skip frames!

2.7. Analyse graphs

Now that you have done all this, you will see graph(s) and table(s) appear on the right. Click on the x or y label to change the variable you want to plot. To plot multiple graphs at once, click the **Plots** button and select the desired number of plots. Right-click on the graph to show additional menus.

Make sure to choose the graphs that you need, so that you can answer your research question.

- x: position x-component
 - y: position y-component
 - r: position magnitude
 - θr: position angle
 - vx: velocity x-component
 - vy: velocity y-component
 - v: velocity magnitude
 - θv: velocity angle
 - ax: acceleration x-component
 - ay: acceleration y-component
 - a: acceleration magnitude
 - θa: acceleration angle
 - θ: rotation angle
 - ω: angular velocity
 - α: angular acceleration
 - step: step number
 - frame: frame number
 - px: momentum x-component
 - py: momentum y-component
 - p: momentum magnitude
 - θp: momentum angle
 - K: kinetic energy
- Define...



- Zoom In
- Zoom Out
- Autoscale
- Scale...
- Points
- Lines
- Snapshot
- Copy Image
- Define...
- Analyze...
- Print...
- Help...

row	t	x
0	0.132	0
1	0.198	0.113
2	0.264	0.227
3	0.33	0.341
4	0.396	0.455
5	0.462	0.57
6	0.528	0.686
7	0.594	0.802
8	0.66	0.919
9	0.726	1.039
10	0.792	1.161

Right-click on the graph and choose the option "Analyze". Here you can calculate averages and you can also calculate the best fitting functions. Choose the right fitting line **for each graph** and write down the function rule (3 characteristic digits will do). **Copy the result in your report:** choose "edit" and then "copy", choose "image". **Do this for each graph.** If necessary, you can save the tracker file for later work.