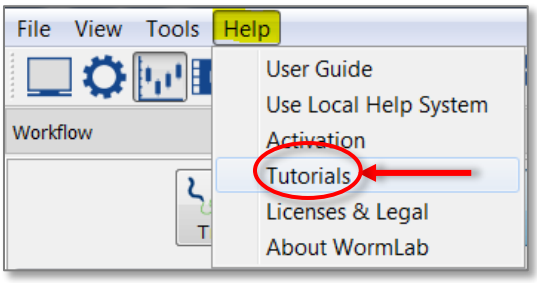
WormLab® Tutorial

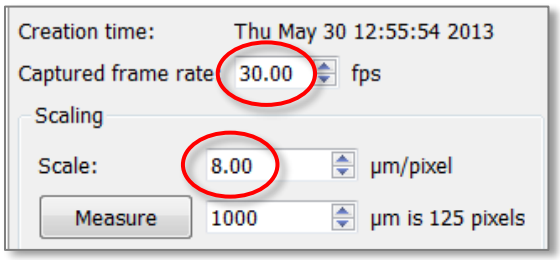
Tutorial: Swimming Worm

In this tutorial, we will use the sample video swimming.avi to demonstrate the basic steps for swimming worms.

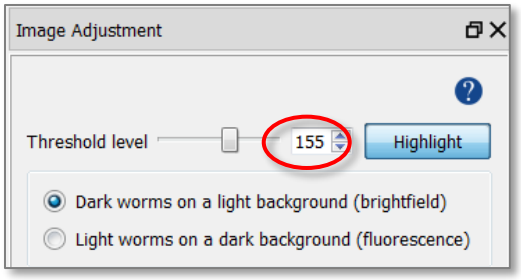
1. Start WormLab.
2. Open the *swimming.avi* video.
   a. Click **Help>Tutorials**.
   b. In the *Tutorials* folder, open the *Video* folder.
   c. Drag the *swimming.avi* file into the WormLab main window (area with the MBF logo).



2. In the workflow, click the **Set Sequence Info** button to open the corresponding panel.
   a. Set the **Captured frame rate** to 30fps.
   b. Set the **Scaling** to 8 µm/pixel.
   c. Click **Save**.

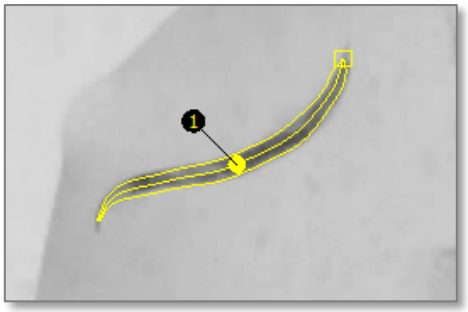


3. In the workflow, click the **Adjust Image** button.
   a. Set the **Threshold Level** to 155.
   b. Click **Apply**.



3. In the workflow, click the **Detect and Track** button.

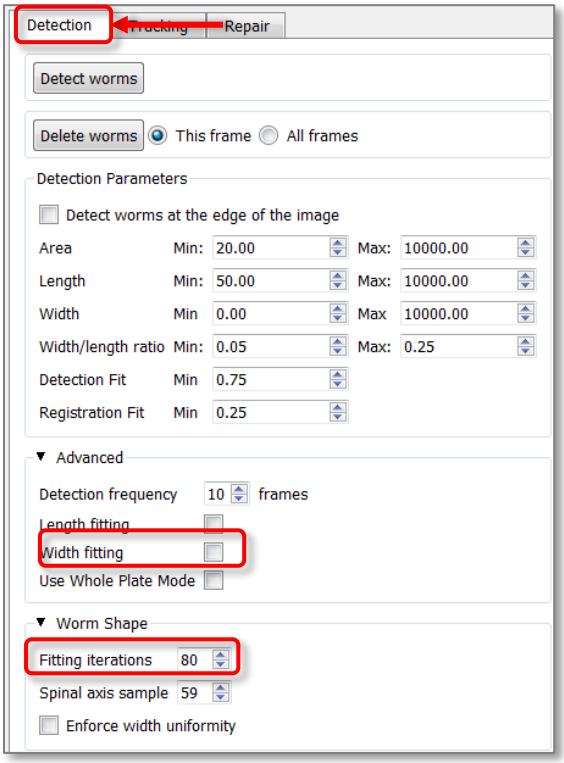
   In the main display, click the worm. WormLab overlays the selected worm in yellow.



4. In the **Detection and Tracking** panel, click the **Detection** tab.

   a. Click the **Advanced** heading and uncheck the **Width Fitting** checkbox.

   b. Click the **Worm Shape** heading and set **Fitting iterations** to 80.



5. Click the **Tracking** tab.

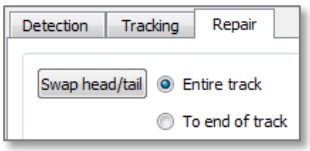
   a. Under **Tracking Parameters**, uncheck **back tracking**.

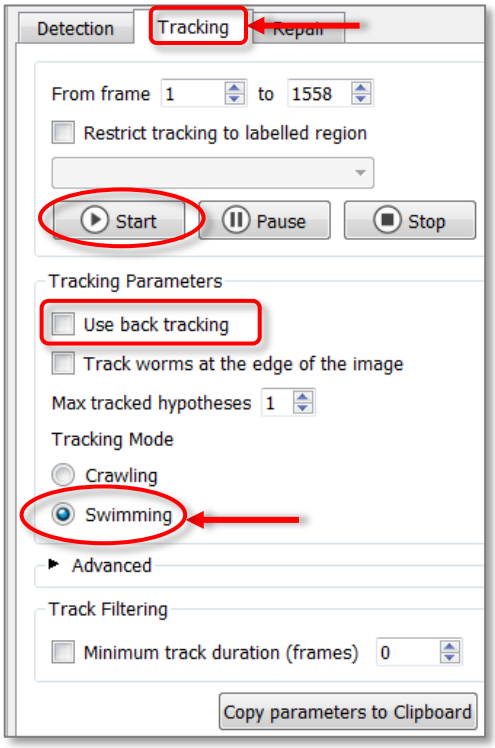
   b. Under **Tracking Mode**, select **Swimming.**

   c. Click the **Start** button (at the top of the panel) to begin tracking.

   WormLab tracks the swimming worm, even while you move the plate to re-center the worm. Wait until WormLab has completed its forward tracking.

   NOTE: For this worm, WormLab has mistaken the tail for its head. This problem can be fixed by clicking the **Repair** tab, then selecting **Swap Head/Tail**: **Entire Track** or to **End of Track**.



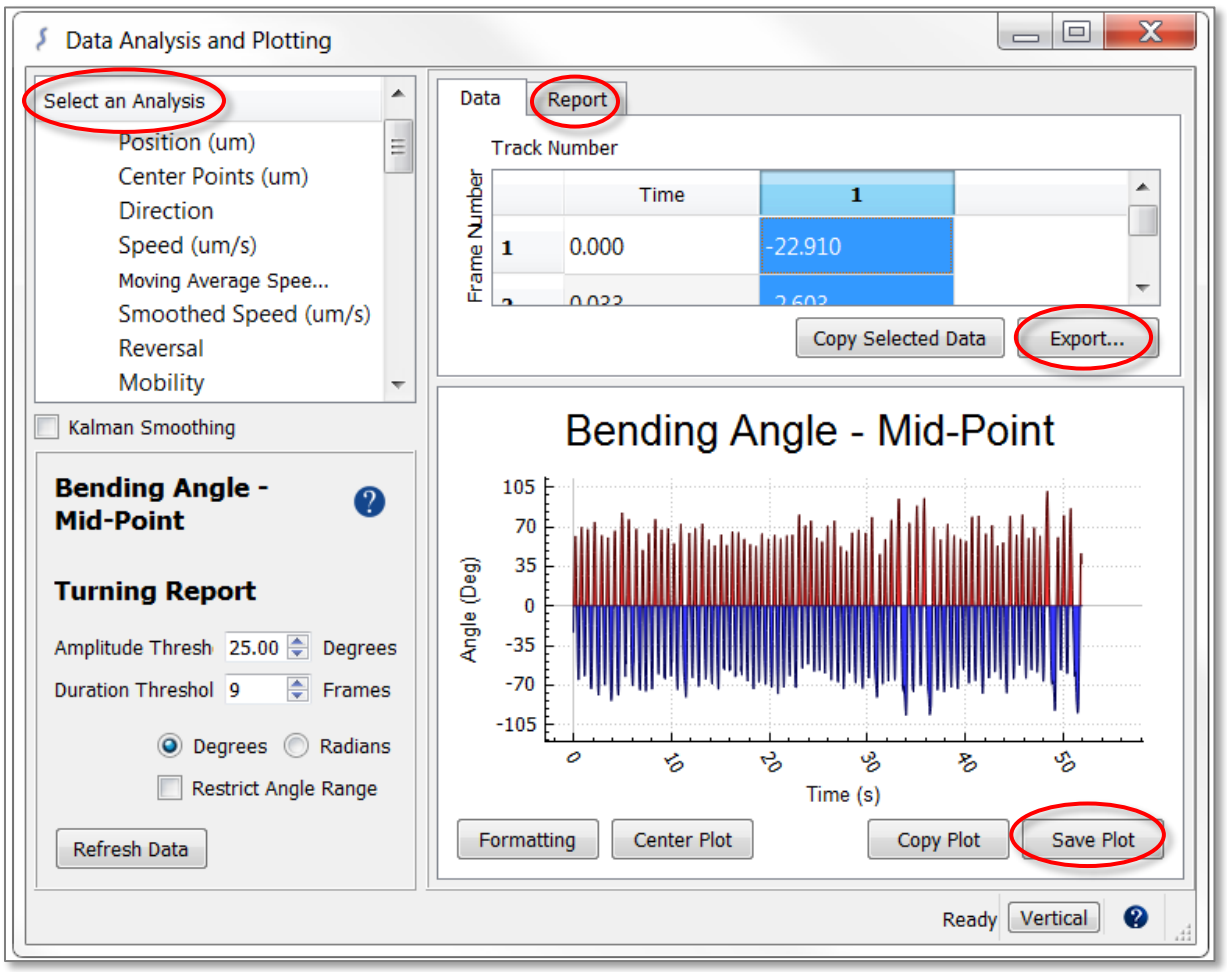


6. In the workflow, click the **Analyze Data** button to open the **Data Analysis and Plotting** window.

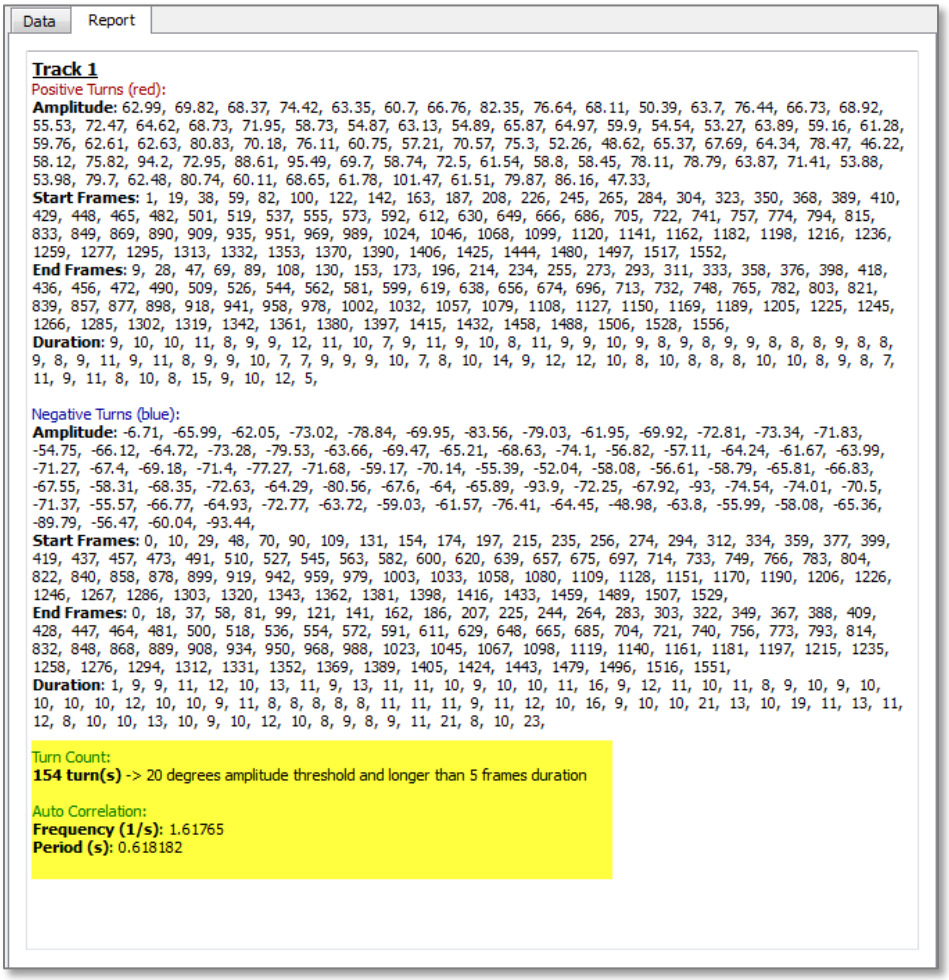
   a. Under **Select an analysis**, click **Body Shape** to expand the list of analyses.

   b. Select the **Bending Angle - Mid-Point** analysis. The results are displayed on the right under the **Data** tab.

      The **Bending Angle** plot shows the bending oscillation of the swimming worm. You can save the plot (**Save Plot** button), export the numerical data (**Export** button), and view the analysis report (**Report** tab).



Below, you'll see the results displayed in a text report under the **Report** tab. We've highlighted the number of turns and the frequency of oscillation. You can select and copy this data to a document or your electronic lab book.



Data | Report

Track 1

Positive Turns (red):

Amplitude: 62.99, 69.82, 68.37, 74.42, 63.35, 60.7, 66.76, 82.35, 76.64, 68.11, 50.39, 63.7, 76.44, 66.73, 68.92, 55.53, 72.47, 64.62, 68.73, 71.95, 58.73, 54.87, 63.13, 54.89, 65.87, 64.97, 59.9, 54.54, 53.27, 63.89, 59.16, 61.28, 59.76, 62.61, 62.63, 80.83, 70.18, 76.11, 60.75, 57.21, 70.57, 75.3, 52.26, 48.62, 65.37, 67.69, 64.34, 78.47, 46.22, 58.12, 75.82, 94.2, 72.95, 88.61, 95.49, 69.7, 58.74, 72.5, 61.54, 58.8, 58.45, 78.11, 78.79, 63.87, 71.41, 53.88, 53.98, 79.7, 62.48, 80.74, 60.11, 68.65, 61.78, 101.47, 61.51, 79.87, 86.16, 47.33,

Start Frames: 1, 19, 38, 59, 82, 100, 122, 142, 163, 187, 208, 226, 245, 265, 284, 304, 323, 350, 368, 389, 410, 429, 448, 465, 482, 501, 519, 537, 555, 573, 592, 612, 630, 649, 666, 686, 705, 722, 741, 757, 774, 794, 815, 833, 849, 869, 890, 909, 935, 951, 969, 989, 1024, 1046, 1068, 1099, 1120, 1141, 1162, 1182, 1198, 1216, 1236, 1259, 1277, 1295, 1313, 1332, 1353, 1370, 1390, 1406, 1425, 1444, 1480, 1497, 1517, 1552,

End Frames: 9, 28, 47, 69, 89, 108, 130, 153, 173, 196, 214, 234, 255, 273, 293, 311, 333, 358, 376, 398, 418, 436, 456, 472, 490, 509, 526, 544, 562, 581, 599, 619, 638, 656, 674, 696, 713, 732, 748, 765, 782, 803, 821, 839, 857, 877, 898, 918, 941, 958, 978, 1002, 1032, 1057, 1079, 1108, 1127, 1150, 1169, 1189, 1205, 1225, 1245, 1266, 1285, 1302, 1319, 1342, 1361, 1380, 1397, 1415, 1432, 1458, 1488, 1506, 1528, 1556,

Duration: 9, 10, 10, 11, 8, 9, 9, 12, 11, 10, 7, 9, 11, 9, 10, 8, 11, 9, 9, 10, 9, 8, 9, 9, 8, 8, 8, 9, 8, 8, 9, 8, 9, 11, 9, 11, 8, 9, 9, 10, 7, 7, 9, 9, 9, 10, 7, 8, 10, 14, 9, 12, 12, 10, 8, 10, 8, 8, 8, 10, 10, 8, 9, 8, 7, 11, 9, 11, 8, 10, 8, 15, 9, 10, 12, 5,

Negative Turns (blue):

Amplitude: -6.71, -65.99, -62.05, -73.02, -78.84, -69.95, -83.56, -79.03, -61.95, -69.92, -72.81, -73.34, -71.83, -54.75, -66.12, -64.72, -73.28, -79.53, -63.66, -69.47, -65.21, -68.63, -74.1, -56.82, -57.11, -64.24, -61.67, -63.99, -71.27, -67.4, -69.18, -71.4, -77.27, -71.68, -59.17, -70.14, -55.39, -52.04, -58.08, -56.61, -58.79, -65.81, -66.83, -67.55, -58.31, -68.35, -72.63, -64.29, -80.56, -67.6, -64, -65.89, -93.9, -72.25, -67.92, -93, -74.54, -74.01, -70.5, -71.37, -55.57, -66.77, -64.93, -72.77, -63.72, -59.03, -61.57, -76.41, -64.45, -48.98, -63.8, -55.99, -58.08, -65.36, -89.79, -56.47, -60.04, -93.44,

Start Frames: 0, 10, 29, 48, 70, 90, 109, 131, 154, 174, 197, 215, 235, 256, 274, 294, 312, 334, 359, 377, 399, 419, 437, 457, 473, 491, 510, 527, 545, 563, 582, 600, 620, 639, 657, 675, 697, 714, 733, 749, 766, 783, 804, 822, 840, 858, 878, 899, 919, 942, 959, 979, 1003, 1033, 1058, 1080, 1109, 1128, 1151, 1170, 1190, 1206, 1226, 1246, 1267, 1286, 1303, 1320, 1343, 1362, 1381, 1398, 1416, 1433, 1459, 1489, 1507, 1529,

End Frames: 0, 18, 37, 58, 81, 99, 121, 141, 162, 186, 207, 225, 244, 264, 283, 303, 322, 349, 367, 388, 409, 428, 447, 464, 481, 500, 518, 536, 554, 572, 591, 611, 629, 648, 665, 685, 704, 721, 740, 756, 773, 793, 814, 832, 848, 868, 889, 908, 934, 950, 968, 988, 1023, 1045, 1067, 1098, 1119, 1140, 1161, 1181, 1197, 1215, 1235, 1258, 1276, 1294, 1312, 1331, 1352, 1369, 1389, 1405, 1424, 1443, 1479, 1496, 1516, 1551,

Duration: 1, 9, 9, 11, 12, 10, 13, 11, 9, 13, 11, 11, 10, 9, 10, 10, 11, 16, 9, 12, 11, 10, 11, 8, 9, 10, 9, 10, 10, 10, 10, 12, 10, 10, 9, 11, 8, 8, 8, 8, 8, 11, 11, 11, 9, 11, 12, 10, 16, 9, 10, 10, 21, 13, 10, 19, 11, 13, 11, 12, 8, 10, 10, 13, 10, 9, 10, 12, 10, 8, 9, 8, 9, 11, 21, 8, 10, 23,

Turn Count:

154 turn(s) -> 20 degrees amplitude threshold and longer than 5 frames duration

Auto Correlation:

Frequency (1/s): 1.61765

Period (s): 0.618182

7. Click **Save Project**, give the project a file name, then click **Save**.