

kymo2trace

Tutorial

This MATLAB function converts a kymograph into a position versus time trace. The time trace can then be subject to further analysis. The position is given by the location of the end minus the initial location providing in this way the difference or change in length of an analyzed filament end.

The implementation requires Image Toolbox.

Parameters needed:

Pixel size of the camera used

Cycle time: time between acquired frames in seconds

Filename: the name the saved results will have

Image to analyze: Path and name of the kymograph to be analyzed

Options

Double end: set to 1 if both ends are going to be analyzed

Mean: set this to 1 to print the mean elongation rate on the main command window

Depol: set this to 1 if the change in length is negative, i.e. the filament is depolymerizing

Emin: threshold to calculate pausing probability

NP: number of points to average during the running mean

Output:

A file with all parameters and a figure displaying the change in length versus time and its instantaneous elongation rate ( $dx/dy$ ) as a function of time.

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Once names and path has been set, press Run

A window will appear that displays the kymograph:

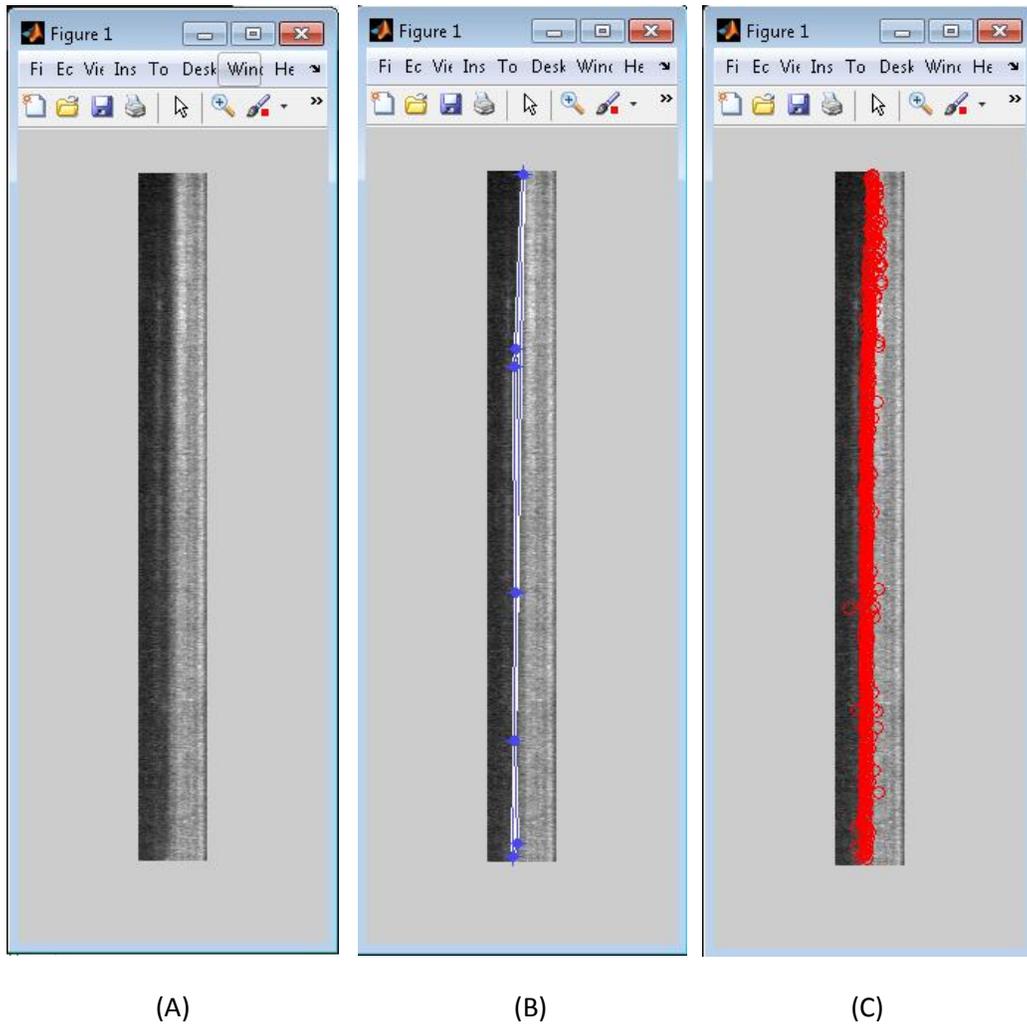


Figure 1.

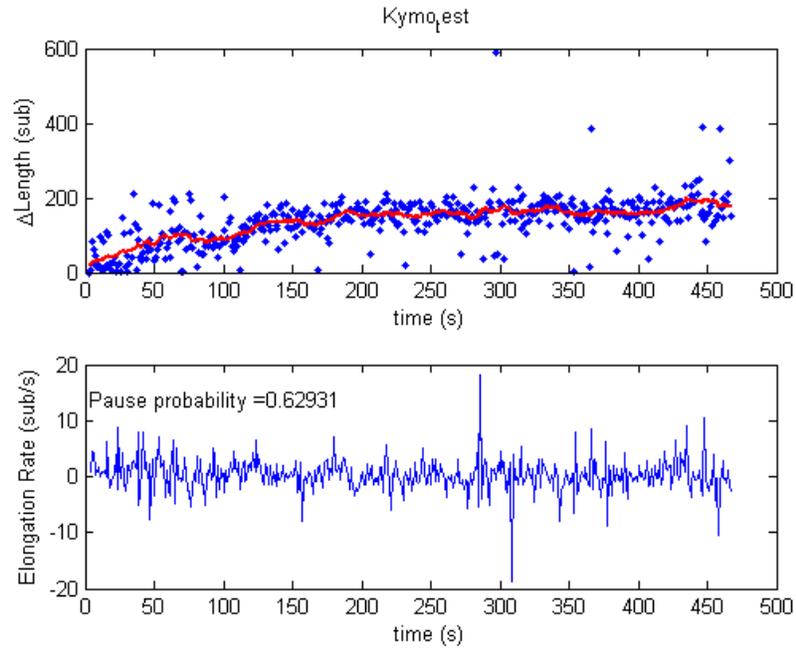
Draw a segmented line

To aid in end detection with the mouse draw a line over the end. The line can be segmented with one click (single blue dots in Figure 1B), at the end double click twice to end the end detection. This segmented line serves as initial values for fitting the end using an inverted error function (see main paper for details).

The line could also be straight with no segments added.

To check that the end detection worked fine, one can use the option Check in the code and set it to 1.

Output graphic



Printed on the figure is also the pause probability, defined as the ratio of time spend with an elongation rate above a threshold (here 1 sub/s) over the total amount of time.

To calculate the instantaneous elongation rate a running mean is used on the raw data (blue points on upper panel). The threshold is set in Emin.