Polymer-Elasticity

# System requirements

## Necessary Programs

* Matlab (= 2019a)
* Python (= 3.7)

## Necessary Matlab Apps

* Kraftkurven.mlapp

## Necessary Matlab Scripts

* Polymer\_elasticity (>= 2)

## Necessary Librarys

* Utility Function Library

# General Information

The polymer-elasticity script can be used to fit the model of the extended, freely jointed chain to results of force-clamp experiments (and only this functionality has been designed for this script). The model is as follows [1, 2]:

Where represent the force-dependent expansion of the measured molecule and represent the force applied in z-direction to the molecule. The free parameters of the model are

* : Segment-Elasticity in
* : Contour-Length in
* : Kuhn-Length (Monomer-Length) in

The constant Parameters are the Boltzmann constant as well as the absolute Temperature .

This model is fitted to the plotted inverse function (path vs. force) at the data range selected in polymer\_elasticity.

# Execution of the Program

Before starting the program, the following points must be met:

* • The Utility Function Library must persist on the MATLAB path
* • A Python interpreter must have been determined in Matlab (see Matlab documentation on pyversion)

Execution of the program start:

1. Create the DataSelection variable using the app *Kraftkurven*
   1. Open *Kraftkurven* using the Load button
   2. Close all Matlab Figure tools
   3. Right-click on any graph --> *Graphen Staffeln*
   4. Right-click on a specific graph --> open graph in new image
   5. Close all Figure tools in the new window
   6. Right-click on the free area around the graph
   7. Select a specific selection type and mark the data
   8. Right-click on the selected data area --> To Workspace
2. Start the *polymer\_elasticity* script by clicking on the Run button in the Matlab editor or by pressing the F5 key while the Matlab editor is activated

# User Guide

Further information can be found in the help tab on the slide panel (the panel with the character ">>").

References

[1] A. Janshoff, M. Neitzert, Y. Oberdörfer, and H. Fuchs, “Kraftspektroskopie an molekularen Systemen: Einzelmolekülspektroskopie an Polymeren und Biomolekülen,” *Angewandte Chemie (International ed. in English)*, no. 112, pp. 3346–3374, 2000.

[2] M. I. Giannotti and G. J. Vancso, “Interrogation of single synthetic polymer chains and polysaccharides by AFM-based force spectroscopy,” (eng), *Chemphyschem : a European journal of chemical physics and physical chemistry*, vol. 8, no. 16, pp. 2290–2307, 2007.