How to fit using Matlab without knowing Matlab

Hans Harhoff Andersen*

Department of Physics and Astronomy, Aarhus University, Denmark

September 5, 2013

Since EasyPlot is a terrible program I will present a small guide for you to fit in Matlab even when you don't know the syntax of the programming part.

The first step is to obtain your data file, typically from PicoScope, as a text file. Open Matlab and find the *Workspace*. In *Workspace* press the button labelled *Import data*. Find your data file.

Select the right *Column Separator(s)* (Tab for PicoScope, commas for CSV-files) and check that the data is read correctly into the little spreadsheet on the right. Press Next. Select *Create vectors from each column using column names* (this only works if the data has a header ie. some text at the top like

```
Time  x  y
```

but if it doesn't you can just add a line saying that. You can rename the variables (to e.g. x and y) here by right clicking the name and choosing *Rename variable*. Press finish. You now have the vectors of data corresponding to time and voltage from PicoScope. To calibrate this data you can write in the command prompt e.g

```
time = x*2.4
position = y*0.005
```

using your own values for calibration.

Type cftool at the command window (you can open the command window via the menu: *Window → Command Window*) which opens the curve fitting toolbox. Select what X and Y data you want to use e.g. time and position. Where it says *Polynomial* change to *Custom Equation* (In version 2009 you also need to press *General Equation*). Write your expression for y as a function of x e.g.

```
a*sin(2*pi/b*(x+c))+d
```

after which Matlab will generate a fit through the data points. Most likely the fit will not be very good and you will need to press *Fit Options* and enter the *StartPoint* for all the variables. The *StartPoints* should be the numbers you expect from the data. Every time you enter a new value Matlab recalculates the fit. When the fit line roughly goes through the data points you can close the Fit Options.

To save the figure in Matlab 2009 just choose *File → Print to figure*.

To save the figure in Matlab 2012 go to the menu *File → Generate Code*. This will generate some code that will do what you just asked for in *cftool*. Save the code-file and then run it like this (assuming you named the file createFit.m):

```
createFit(time, position)
```

---

*hha07@phys.au.dk

This will generate a Matlab figure where you can edit labels, legends, style and so on. When you are done, save the figure in any format you like. For inclusion in Latex documents you probably want *pdf*. If you want to be able to open it again in Matlab and continue editing you can save it as a fig-file.

Matlab can do much more than this, and by writing scripts you can do these things in a much nicer way. In the course *Numerisk Fysik* you will learn a lot more about Matlab, fitting and programming in general.