Readme for the code used to perform parameter fits and bootstrapping for two experimental data sets in “Fitting functional response surfaces to data: a best practice guide” by Uszko, Diehl and Wickman.

The files in this folder include several matlab code files (.m-files), as well as two matlab data files (.mat-files) containing formatted data for two experimental series in which Daphnia fed on algae.

The top-level file is "main.m", from which the code performing the parameter fitting and bootstrapping can be initiated. Here, one can set whether fits should be on untransformed or log-transformed data, whether the sequential or simultaneous fitting method should be used, and whether data resampling or residual resampling should be used for the bootstrapping. One can also select the number of bootstraps that should be performed for the fit. Furthermore, one can select which of the two experimental series should be used in the fitting.

Running the file "main.m" without any alterations will perform a fit using log-transformed data with simultaneous fitting, and compute 10 bootstrap fits, using experimental series 2. Running the file with these parameters should not take more than a few seconds on most computers.

More detailed instructions and comments are available in the code-files themselves.

Additional notes on the code:

1) When running the code -- especially with untransformed data and/or sequential fits -- matlab may sometimes issue warnings. This is not a problem in and of itself, as our code will mark any fit where a warning was issued as not having converged, which can be seen in the results of the fitting procedure.

2) When we generated the data for the manuscript, we used the ODE-solver routine 'ode15s'. After the data was already generated, we discovered that the routine 'ode45' is actually faster in a majority of cases. We have therefore changed the routine in the supplied code to 'ode45'.

3) As we use a numerical program for finding the optimal fit to each bootstrap data set, fits are not always perfect, and sometimes the code returns rare outlier fits. It is therefore advisable to check the fitted bootstrap coefficients for anomalies before proceeding with any analysis. The fitting method we advocate in the manuscript -- simultaneous fits to log-transformed data -- is much less prone to this kind of behavior.