

1D Deconvolution

One-dimensional deconvolution

This page contains the computational Matlab files related to the book [Linear and Nonlinear Inverse Problems with Practical Applications](#) written by Jennifer Mueller and Samuli Siltanen and published by SIAM in 2012.

You can order the book [at the SIAM webshop](#).

[Go to master page](#)

Simulation of convolution data

You will need these files:

[DC_PSF.m](#), [DC_target.m](#), [DC_convmtx.m](#).

These routines create and plot high-resolution convolution data:

[DC1_cont_data_comp.m](#), [DC1_cont_data_plot.m](#).

For practical purposes we need discrete and not so high-dimensional data:

[DC2_discretedata_comp.m](#), [DC2_discretedata_plot.m](#).

You can try out naive deconvolution:

[DC3_naive_plot.m](#)

Truncated SVD

Here is a routine for recovering the original signal from convolution data using truncated singular value decomposition. Note that the program pauses after each plot and waits for you to press any key to continue. You can see how the reconstruction changes when more singular vectors are used.

[DC4_truncSVD_comp.m](#)

Tikhonov regularization

In this routine you can use classical Tikhonov regularization for the deconvolution task. Try to change the regularization parameter and see what happens!

[DC5_Tikhonov_comp.m](#)

This file implements generalized Tikhonov regularization with derivative penalty. Again, test the effect of changing the regularization parameter.

[DC6_TikhonovD_comp.m](#)

Total variation regularization

Here we apply the total variation regularization to the deconvolution problem.

[DC7_TotalVariation_comp.m](#)