

Matrix-free X-ray tomography

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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](#).

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Here we solve tomographic problems without constructing the measurement matrix A at all.

Simulate tomographic data without inverse crime

This routine uses the `radon.m` function of Matlab's Image processing toolbox to create a sinogram:

[XRA_NoCrimeData_comp.m](#)

Compute reconstruction using filtered back-projection

[XRB_FBP_comp.m](#)

Compute reconstruction using matrix-free iterative Tikhonov regularization

[XRC_Tikhonov_comp.m](#), [XRC_Tikhonov_plot.m](#)

Compute reconstruction using matrix-free iterative (approximate) total variation regularization

Here are the main computation and plot routines:

[XRD_aTV_comp.m](#), [XRD_aTV_plot.m](#)

You will also need these files:

[XR_aTV_feval.m](#), [XR_aTV_fgrad.m](#), [XR_aTV_grad.m](#), [XR_aTV.m](#), [XR_misfit_grad.m](#), [XR_misfit.m](#)