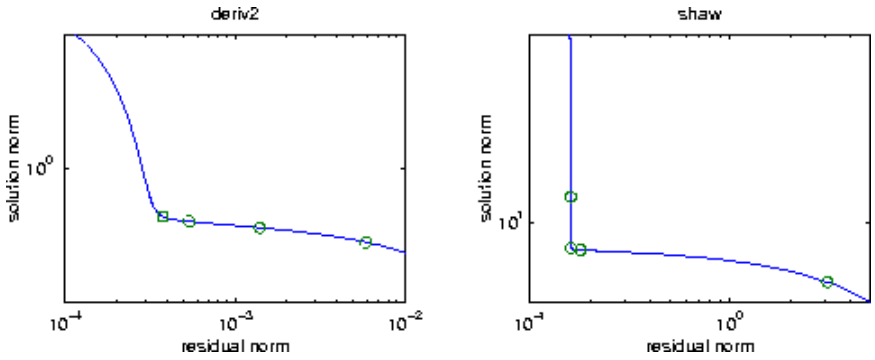

Regularization Tools Version 4.1 (for Matlab Version 7.3)

A Matlab package for analysis and solution of discrete ill-posed problems, developed by Prof. Per Christian Hansen, Dept. of Informatics and Mathematical Modelling, Technical Univ. of Denmark.

The package's home page at Matlab Central.

Background

The software package Regularization Tools, Version 4.1 (for Matlab Version 7.3), consists of a collection of documented Matlab functions for analysis and solution of discrete ill-posed problems. By means of this package, the user can experiment with different regularization strategies, compare them, and draw conclusions that would otherwise require a major programming effort. In addition to the analysis and solution routines, the package also includes 12 test problems. The package and the underlying theory is published in:

- P. C. Hansen, *Regularization Tools: A Matlab package for analysis and solution of discrete ill-posed problems*, Numerical Algorithms, 6 (1994), pp. 1-35.

The most recent version of the package is described in:

- P. C. Hansen, *Regularization Tools Version 4.0 for Matlab 7.3*, Numerical Algorithms, 46 (2007), pp. 189-194.

See also the published book:

- P. C. Hansen, *Rank-Deficient and Discrete Ill-Posed Problems: Numerical Aspects of Linear Inversion*, SIAM, Philadelphia, 1998.

Software

The software consists is available as a compressed file:

- Zip file Software.zip.

The software is also available in the NumerAlgo directory at Netlib. Versions 2.1 and 3.0 of the software are also available in the same directory.

Manual

The accompanying manual, which also includes a description of the underlying algorithms, as well as a tutorial, is electronically available:

- Table of contents (pdf file).
- Complete manual (pdf file).

The hardcopy version of the manual is also available from IMM as a Lecture Note.

Additional Matlab software

The function TVreg.m computes a 1D Total Variation regularized solution.

The function preprocL.m can be used to preprocess an arbitrary L matrix such that it conforms with the requirements in Regularization Tools; requires that the UTV Tools package is installed.

The 212-times-100 helioseismology problem used in several of my papers is available either as an m-file helio.m or as a mat-file helio.mat (note: some browsers try to change the file extension when saving this mat-file).

The functions mblur.m and oblur.m compute block Toeplitz matrices representing motion blur and out-of-focus blur, respectively.

The function pptsvd.m computes piecewise polynomial regularized solutions by means of the PP-TSVD algorithm. Note that the computing time can be very large for large problems.