

E-LETTER of the Numerics in Control Network NICONET
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or from the WGS ftp site:

<ftp://wgs.esat.kuleuven.ac.be> (directory pub/WGS/E-LETTER/)

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1 welcome to the NICONET E-letter number 15!

This E-letter is sent out quarterly and informs you about the newest updates. Also, new NICONET reports and important NICONET activities are announced in this E-letter. Our last NICONET meeting before the EC project comes to its end was hold in Oxford on April 8, 2002. The next issue of this E-letter is planned for July 2002. Please send contributions before June 30. In particular, we encourage contributors to provide information on the use of the SLICOT library (performance, improvements, new suggestions).

Sabine van Huffel
Chairperson of WGS and Coordinator of NICONET.

2 New additions to SLICOT since February 2002

Communicated by Vasile Sima:

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The latest changes in the library contents or routine updates - till the next SLICOT Release - are announced in the file Release.Notes, located in directory /pub/WGS/SLICOT/ on the WGS ftp site. Previous updates are described, in reverse chronological order, in the file Release.History, located in the same directory.

SLICOT routines can be downloaded from the WGS ftp site:

`ftp://wgs.esat.kuleuven.ac.be`

(directory /pub/WGS/SLICOT/ and its subdirectories) in compressed (gzipped) tar files. On line .html documentation files are also provided there. The library and its documentation are also accessible from the WGS homepage at the World Wide Web URL:

`http://www.win.tue.nl/niconet/`

after linking from there to the SLICOT web page and clicking on the FTP site link in the freeware SLICOT section.

The latest SLICOT Library updates took place on February 22, and April 9, 2002.

The major update on February 22 included few changes in some routines and addition of about 25 new routines. Most of the changes have been performed to initialize some variables in certain cases. Some of them are related to the optimal workspace length. The updated routines are: AB01MD, AB09HD, AB09HX, AB09KD, BB01AD, BB02AD, MA02CD, MB01PD, MB03PY, MB03WD, SB02RD, SB03OD, SB10RD, TB01LD, TB01ZD, and TG01ED. Details are given in the file Release.History. Few changes have been also done in the example programs TAB09MD, TAB09ND, TAB13MD, TBB01AD, and TBB02AD, in three benchmark data files, and in two mexfiles (syscom and findBD).

The new user-callable and computational routines posted on February 22 include Identification Routines, Mathematical Routines, and Transformation Routines. Their main tasks have been described in the previous issue of this E-letter and will not be repeated here.

All test (example) programs which contained MAX and/or MIN intrinsic functions calls in PARAMETER statements have now a version without these calls, in order to be compliant with the Fortran 77 standard. The modified files (over 100), and all the other example programs (.f), data (.dat) and results (.res) files, are stored in the subdirectory examples77.

The Matlab 5.3 toolboxes have been saved in a new subdirectory, called "SLToolboxes5", of the MatlabTools directory of the ftp site. The former subdirectory "SLToolboxes" now contains the Matlab 6 versions of all files, including .dll files. The Matlab 5.3 files will not be updated in the future.

A new mexfile and associated m-file for generating benchmark examples for algebraic Riccati equations have been made available.

The SLICOT Library update on April 9, 2002, included corrections in few routines (AG08BD, AG08BY, IB03BD, MB04VX, MD03BF, SB03MX, SB03OD, SG03BD, TB01LD, TB01VD, and TB01VY), an example program (TAG08BD), four m-files, and six .html files. Details are given in the file Release.Notes.

Ten new routines belonging to the chapters Identification Routines, Mathematical Routines and Nonlinear Systems, have been posted on the SLICOT ftp site. These routines have the following main functionality:

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- compute a set of parameters for approximating a Wiener system in a least-squares sense, using a neural network approach and a conjugate gradients or Cholesky-based Levenberg-Marquardt algorithm.
- find the parameters theta for a function $F(x, \theta)$ that give the best approximation for $y = F(x, \theta)$ in a least-squares sense using a Levenberg-Marquardt algorithm based on conjugate gradients or Cholesky factorization for solving linear systems.
- evaluate the functions and Jacobian matrices for optimizing the parameters of the nonlinear part of a Wiener system (initialization phase).
- evaluate the functions and Jacobian matrices for solving a standard nonlinear least squares problem using conjugate gradients or Cholesky-based solvers.
- compute the matrix $J'J + cI$, for the Jacobian J either given in a compressed form, or fully given (for one output variable).
- compute the matrix-vector product $x \leftarrow (J'J + cI)x$, for the matrix J either given in a compressed form, or fully given, where c is a scalar.

Three new test programs, a mexfile and an m-file, covering the above functionality, have been included. The toolbox for nonlinear Wiener systems identification has been updated and completed.

A new directory (of the SLICOT ftp site root directory), plicmr, and its subdirectory, doc, now contain the on-line html documentation files for the currently available parallel SLICOT library routines (for large order model reduction).

3 New NICONET Reports since January 2002

Communicated by Sabine Van Huffel:

The following NICONET reports can be downloaded as compressed postscript files from the world wide web URL:

<http://www.win.tue.nl/niconet> and choose: reports

or from the WGS ftp site:

<ftp://wgs.esat.kuleuven.ac.be> (directory pub/WGS/REPORTS/)

FILE NAME: SLWN2002-1.ps.Z
REPORT NUMBER: 2002-1
FORMAT: Compressed postscript.
AUTHORS: Peter Benner, Enrique S. Quintana-Orti, Gregorio Quintana-Orti, Rafael Mayo
TITLE: Enhanced Services for Remote Model Reduction of Large-Scale Dense Linear Systems
ABSTRACT: This paper describes enhanced services for remote model reduction of large-scale, dense linear time-invariant systems. Specifically, we describe a mail service and a web service for model reduction on a cluster of Intel Pentium-II architectures using absolute and relative error methods. Experimental results show the appeal and accessibility provided by these services.
STATUS: available since January 2002

FILE NAME: SLWN2002-2.ps.Z
REPORT NUMBER: 2002-2
FORMAT: Compressed postscript.
AUTHORS: Y. Chahlaoui and P. Van Dooren
TITLE: A collection of Benchmark examples for model reduction of linear time invariant dynamical systems

ABSTRACT: In order to test the numerical methods for model reduction we present here a benchmark collection, which contain some useful real world examples reflecting current problems in applications. All simulations were obtained via Matlab and some SLICOT programs of Niconet.
STATUS: available since February 2002 and revised in March 2002

FILE NAME: SLWN2002-3.ps.Z
REPORT NUMBER: 2002-3
FORMAT: Compressed postscript.
AUTHORS: F. Alvarruiz and V. Hernandez
TITLE: Definition and implementation of a SLICOT interface and a MATLAB Gateway for the solution of non-linear programming problems
ABSTRACT: This paper presents SLICOT and MATLAB interfaces for the FSQP package, which stands for Feasible Sequential Quadratic Programming. The SLICOT interface enables the user to call the FSQP package by means of a subroutine with a SLICOT-compliant calling sequence. By means of the MATLAB interface the user can call the package from MATLAB, defining the problem by means of MATLAB functions. The interfaces could be extended in the future in order to consider other nonlinear programming solvers, although some restructuring of the interfaces would be necessary.
STATUS: available since March 2002

FILE NAME: SLWN2002-4.ps.Z
REPORT NUMBER: 2002-4
FORMAT: Compressed postscript.
AUTHORS: F. Alvarruiz and V. Hernandez
TITLE: Definition and implementation of a SLICOT interface and a MATLAB Gateway for the solution of nonlinear equations systems
ABSTRACT: This paper presents SLICOT and MATLAB interfaces for the KINSOL software package, used for solving nonlinear equations systems. The SLICOT interface enables the user to call the KINSOL package by means of a subroutine with a SLICOT-compliant calling sequence. By means of the MATLAB interface the user can call the package from MATLAB, defining the problem by means of MATLAB functions. The interfaces could be extended in the future in order to consider other nonlinear equations systems solvers, although some restructuring of the interfaces would be necessary.
STATUS: available since March 2002

4 NICONET events

The NICONET project has been extended with 6 months. An extra meeting of all partners was hold in Oxford on April 8, 2002.

5 (Forthcoming) Meetings and symposia attended by NICONET partners

Communicated by Vasile Sima and Sabine Van Huffel:

Conferences related to the NICONET areas of interest, where NICONET partners presented or will present NICONET/SLICOT-related talks and papers, and/or disseminate information and promote SLICOT, are the following:

GAMM Annual meeting, Augsburg, Germany, March 25-28, 2002.

IFAC symposium on parameter estimation, Barcelona, Spain, March

2002.

15th Householder symposium on Numerical Linear Algebra, Peebles Hotel Hydro, Scotland, June 17-21, 2002.

MTNS, ``Mathematical Theory of Networks and Systems'' meeting 2002, University of Notre Dame, South Bend, Indiana, USA, August 12-16, 2002, see <http://www.nd.edu/mtns/>

Joint ``IEEE Conference on Control Applications'' and ``IEEE Conference on Computer Aided Control Systems Design'', September 17-20, 2002, Scottish Exhibition & Conference Centre, Glasgow, Scotland.

END OF THE NICONET E-LETTER
