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E-LETTER of the Numerics in Control Network NICONET  
Issue no. 7, April 30, 2000

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CONTENTS:

- 1 Welcome to the NICONET E-letter number 7!
  - 2 New additions to SLICOT since January 2000
  - 3 SLICOT developments
  - 4 New NICONET Reports since January 2000
  - 5 NICONET events
  - 6 (Forthcoming) Meetings and symposia attended by NICONET partners
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1 Welcome to the NICONET E-letter number 7!

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.

The next issue of this E-letter is planned for July 2000. Please send contributions before July 10. 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.

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2 New additions to SLICOT since January 2000

Communicated by Vasile Sima:

The latest full library update took place on February 18, 2000. Two routines (BB01AD and BB02AD), which generate benchmark examples for the numerical solution of continuous-time and discrete-time algebraic Riccati equations have been added, and the associated data files have been included in the subdirectory `benchmark_data`. In addition, makefiles for compiling the library, as well as for linking and running the example programs on PC's under Windows 95, 98, or NT operating systems, have been posted.

Four example programs (TAB13ED, TAB13FD, TAG08BD, TMB03WD), and two routine documentation files (SB10HD, SB10TD) have been slightly changed. Details are given in the file `Release.Notes`, located in root directory `pub/WGS/SLICOT/` on the WGS ftp site,

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

which describes the latest changes in the library contents or routine updates (till the next SLICOT Release). Previous updates are described, in reverse chronological order, in the file `Release.History`, located in the same directory. These files are updated whenever needed.

Recently, 16 updated routines (AB09AX, AB09BX, AB13AX, MB01TD, MB02MD, MB02UD, MB03UD, SB08HD, SB10DD, SB10ED, SB10FD, SB10HD, SB10PD, SB10UD, TB03AD, TG01ED), and a new routine (MA02GD) have been archived in the file `Erratum.gz` (also in the root directory `pub/WGS/SLICOT/`). Known bugs (in the routines MB01TD, SB08HD, SB10HD, and TB03AD) have been removed; additional changes are due to the modifications performed in the Release 3.0, Update October 31, 1999, of the LAPACK Library routines DBDSQR and DGESVD, related to the workspace length. Details are given in the file `Erratum` (directory `pub/WGS/SLICOT/`). These changes were not yet made in the files `slicot.tar.gz`, `slicotPC.zip`, or in other module files (`module.tar.gz`, where "module" is a routine name).

To decompress the file `Erratum.gz`, one should use

```
gzip -d Erratum
tar xvf Erratum
```

The next major SLICOT Library update will take place in June. About 20 new routines will be added, mainly covering system identification, controller reduction, and optimal synthesis.

SLICOT Library 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/wgs/>

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

The whole library is available as either the file `slicot.tar.gz` (the Unix version), or the file `slicotPC.zip` (the MS-DOS version), both located in the root directory `pub/WGS/SLICOT/`.

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### 3. SLICOT developments

Professors Petko Hr. Petkov and Mihail M. Konstantinov have been working in INRIA since early April, as scheduled.

They are concentrating on the programming of algorithms to calculate mu values. A draft version has been successfully tested and a gateway algorithm has been created so that it can be called from Matlab. Further debugging will be conducted and so will the documentation.

In March, the subroutine SB02PD was completed. The subroutine computes the algebraic Riccati equation solution using the matrix sign function method. SB02PD will shortly be included in the SLICOT package.

The subroutines to synthesize a controller using the  $H_{\infty}$  loop shaping design procedure in the discrete-time case are also under development at the moment and are expected to be completed during the summer.

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### 4 New NICONET Reports since January 2000

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: SLWN2000-1.ps.Z

REPORT NUMBER: 2000-1

FORMAT: Compressed postscript.

AUTHORS: P. Petkov, D.-W. Gu, Mihail M. Konstantinov and V. Mehrmann  
TITLE: Condition and Error Estimates in the Solution of Lyapunov  
and Riccati Equations  
ABSTRACT: The condition number estimation and the computation of  
residual based forward error estimates in the numerical  
solution of matrix algebraic continuous-time and  
discrete-time Lyapunov and Riccati equations is considered.  
The estimates implemented involve the solution of  
triangular Lyapunov equations along with usage of the  
LAPACK norm estimator. Results from numerical experiments  
demonstrating the performance of the estimates proposed are  
presented.  
STATUS: available since January 2000

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5 NICONET events

Communicated by Sabine Van Huffel:

Our third NICONET workshop will be held in Louvain-la-Neuve, Belgium, in  
December 2000. More details follow in forthcoming issues of this E-letter.

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6 (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:

Mathematical Theory of Networks and Systems (MTNS2000), Perpignan,  
France, June 19-23, 2000

UKACC International Conference CONTROL 2000,  
University of Cambridge, United Kingdom, 4 - 7 September 2000

IEEE International symposium on Computer-Aided Control System Design,  
CACSD'2000, Anchorage, Alaska, Sept.25-27 2000.

3rd International workshop on Total Least Squares and Errors-in-Variables  
Modeling, Arenberg castle, Leuven, Belgium, August 27-29, 2001.

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END OF THE NICONET E-LETTER  
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