DOE/OE Transmission Reliability Program

Dynamic System Identification Toolbox Capabilities Update

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CERTS

CONSORTIUM FOR ELECTRIC RELIABILITY TECHNOLOGY SOLUTIONS

Project Objective

Update the Dynamic System Identification (DSI) toolbox to be more portable, incorporate modern data types, and easier to use

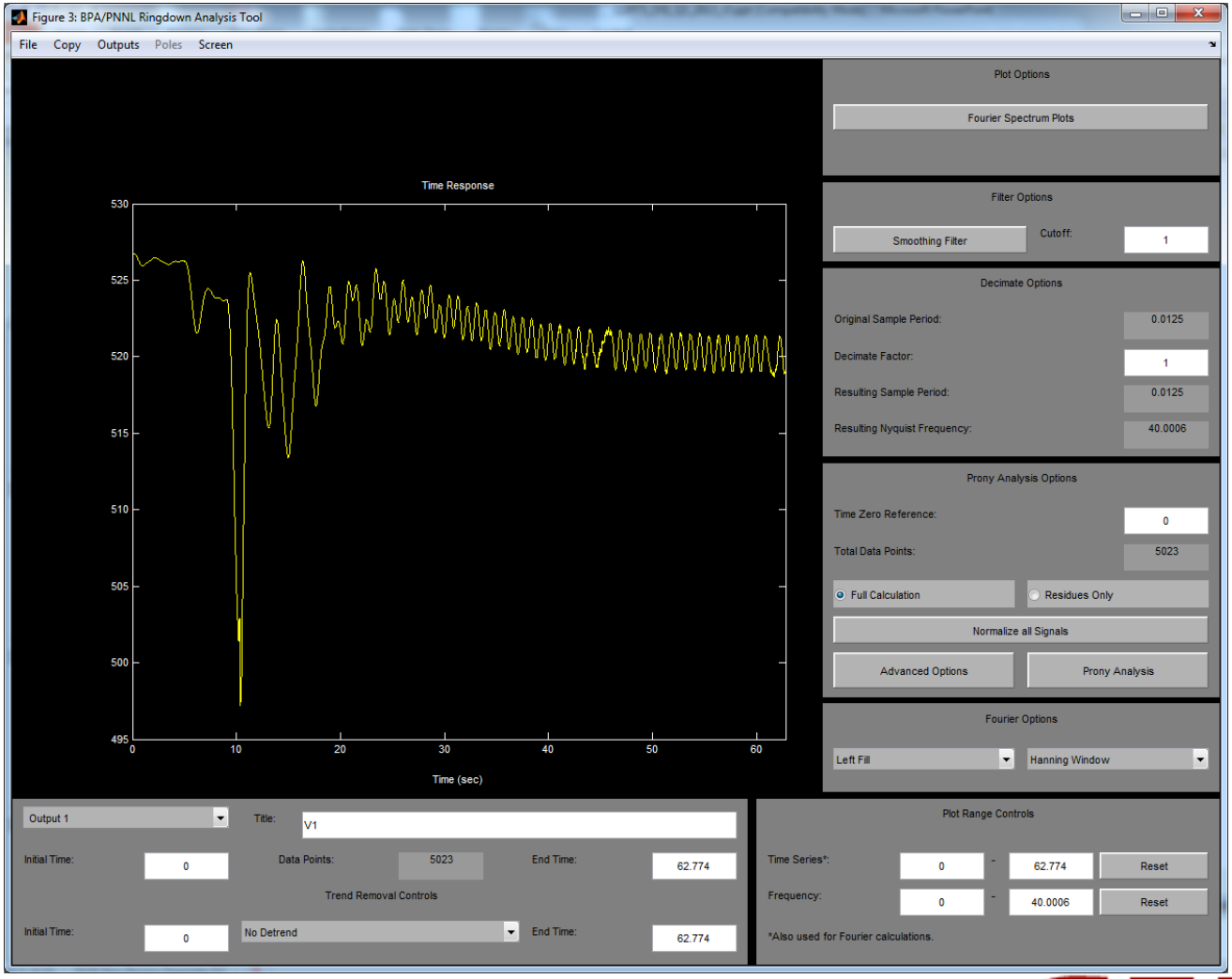
Dynamic System Identification Toolbox

- MATLAB-based collection of phasor measurement-oriented tools
  - Data import/export functions
    - Import – SWX, PPSM, DST (BPA PDC formatted)
    - Export – DST+INI, MAT, CSV
  - Data processing
    - Filtering, resampling, correction
  - Data Analysis
    - Fourier-based techniques
    - Prony Ringdown GUI
    - ModeMeter tools
- PNNL developed on BPA and DOE-OE/CERTS funds

DSI Toolbox Sample Interface

```
Select desired option from list below:
%   1  PDC
%   2  PDC CSV
%   3  PPSM
%   4  SWX
%   5  PDC Special
%   6  PMU
%   7  DCU
%   8  PSAM
%   9  special
%  10  PSMT
%  11  PSDM
%  12  F08
%  13  PPSM Special
%  14  exit or filemerge
   Enter 1 to 14 [1]:  1
PickNo = 1: PDC
Is this ok? Enter y or n [y]:  y
```

Prony Ringdown GUI



DSI Toolbox Update Need

- Many useful features developed over decades of research
- Prototyping environment as a path to algorithm/approach commercialization
  - Generic implementations of analysis types in commercial packages, which allows adjustments and experimentation
  - Reading, preprocessing, and exporting functions incorporated
  - MATLAB basis provides flexibility for new analysis, data processing, and prototyping new algorithms

Major Technical Accomplishments for FY13

- Prototype Development
  - Promote compatibility with multiple versions of MATLAB
    - Migrate legacy FORTRAN code of Prony Ringdown function into MATLAB-native environment
    - Remove all MEX-based calls to external functions

Deliverables and Schedule for FY13

- September 2013
  - Completed MATLAB migration of existing Prony Ringdown tool

Risk Factors

- Prototype Development
  - Conversion of FORTRAN code into native MATLAB
    - Precision may not be sufficient to maintain ringdown results
    - Incompatibilities with different versions may still exist
- Risk Mitigation
  - Selection of appropriate internal functions
  - Manual adjustment of default MATLAB precision

Follow-on Work for FY14

- Incorporate new PMU data formats
  - Updated DST file streams
  - COMTRADE-compatible files
  - Database interfacing
    - SQL
    - PI Historian
- Improve user interface
  - Make more user friendly to expand user base
  - Make common functions easier to access and use
  - Maintain accessibility to more advanced DSI features

Future of the DSI Toolbox

- Provide a MATLAB-based platform for prototyping new PMU and small-signal stability-related algorithms and approaches
- Maintain public availability of the DSI Toolbox (NASPI website, presently) for researchers and industry

QUESTIONS?