NTI Wavelet Tools

Users' Manual

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1 Introduction

NTI Wavelet Tools is a data processing toolbox that is developed and maintained by the Institute of Nuclear Techniques (NTI), Budapest University of Technology and Economics.

The toolbox features a GUI with a collection of tools based on continuous time-frequency transforms - ideal for processing transient signals - and incorporates various other data processing methods that can be run from command line.

The data processing techniques integrated in NTI Wavelet Tools have been described in various papers and reports...

The GUI guides the user through the different steps of data processing step-by-step. Each step is supported by a help text accessed by pressing the "?" button. This text gives the definition of the parameters to be set in the corresponding step, and it might also contain some tips on how to do it.

2 Status

Current development language is IDL (Interactive Data Language), but it is planned to gradually convert to Python.

Released versions are available at ASDEX Upgrade (AUG releases) and at Wigner RCP (FLIPP releases). These releases are maintained to have always the most recent released version, and they can import data from MTR (by Marc MAraschek) at ASDEX Upgrade and FLIPP (by Sandor Zoletnik) at Wigner RCP.

Up-to-date information on the development is to be reached at https://deep.reak.bme.hu/projects/wavelet.

3 Running NTI Wavelet Tools

NTI Wavelet Tools can be either run as an independent IDL program, or the ASDEX release can also be started from the MTR menu. When running as standalone, it can read data from a given format .sav file. Different scenarios are described below.

3.1 Standalone

NTI Wavelet Tools can be started as a regular IDL program.

Steps:

1. Start IDL.
2. Set up the current directory to the directory of NTI Wavelet Tools with the `cd 'PATH'` command.
3. Start NTI Wavelet Tools GUI with the `nti_wavelet_gui` command.
4. Load data from a .sav (IDL binary format) file with the structure specified below.
5. Process the data.
6. Processed data can be saved in a .sav file, and graphical outputs can also be generated. (Default output folder is a subfolder of the NTI Wavelet Tools folder.)

3.1.1 Input data format

In order to use NTI Wavelet Tools to analyse external data an IDL .sav file is needed to be created which can be loaded into the GUI of the toolbox. The file must contain the following variables (the dimensions are critical):

Name of the variable	Description	Type	Dimensions
expname	Name of the experiment	string	1
shotnumber	Shotnumber	long integer	1
channels	Name of the signals	string array	[n]
coord_history	Short description of coordinates	string	1
data_history	Short description of data	string	1
data	Array containing all signals	floating point array	[t, n]
time	Vector containing the time axis	floating point vector	[t]
theta	Theta (poloidal) coordinates	floating point vector	[n]
phi	Phi (toroidal) coordinates	floating point vector	[n]

Table 1: The specific variable names of the NTI Wavelet Tools raw data files. The dimensions are denoted by t and n where t is the length of the time axis and n is the number of the signals.

An example data file is the test.sav in the program directory. Data manipulations should be traced by adding a string to the data_history or coordinates_history variable.

3.2 ASDEX release - call from MTR

ASDEX release of NTI Wavelet Tools can be run from the Menu of the MTR data processing program.

Steps:

1. Log into AUG AFS.
2. Log into an sxaug20-24 machine (for example: ssh `sxaug22`)
3. Star MTR using the `mtr_dev` command.
4. Load and pre-process data in MTR.
5. Start NTI Wavelet Tools GUI by choosing the `Wavelet/NTI Wavelet` menu item.
6. Process the data.
7. Processed data can be saved in a .sav file, and graphical outputs can also be generated. (Default output folder is a subfolder of the NTI Wavelet Tools folder.)

3.3 FLIPP release

FLIPP release of NTI Wavelet Tools can read using the `nti_wavelet_flipp` command in the IDL command line. After reading the data by FLIPP routines, it calls NTI Wavelet GUI with these data.

4 Final notes

Further help and feedback is accessible at the bug reporting interface and forum of the NTI Wavelet Tools project that is to be reached form the Help menu of the NTI Wavelet Tools GUI.