UseCase.0008 (1.0)

Data Array Ribbons

Keywords: data array, document specific ribbon, view, manipulation, detector
Description

• This use case explains the three document specific ribbons for data arrays (i.e. View, Manipulations, Detectors).
• Data arrays are of central concern within VirtualLab because they are the numerical object for stored data.
• An overview of the view options, manipulation tools and detectors for data arrays will be given.
• The document specific ribbons for 2D equidistant data arrays will be discussed.
View Ribbon

- The view ribbon can be used to set up the view parameters for the visualization of the data array.
- It allows access to the specification of the field quantity to be shown, value scaling, selection tools, zoom and aspect ratio and copy functions.
View Ribbon – Field Quantity

- If the active data array is complex-valued the user can specify the field quantity to be shown.
- The user can select
  - Real Part
  - Imaginary Part
  - Amplitude
  - Phase
  - Squared Amplitude
- For real-valued data arrays this view setting is not available.
View Ribbon – Value Scaling

- The user can also specify the value scaling parameters for the view.
- The following parameters are available
  - 2D or 3D visualization
  - Use Interpolated Values
  - Color Lookup Table to Visualize
  - Automatic Scaling / User-defined Scaling (can be triggered selection based)
  - Show/Hide Legend
VirtualLab allows the usage of several selection tools.

The following selection tools are available:
- Point Marker (0D)
- Line Marker (1D)
- Rectangle or Ellipse Marker (2D)

The user can specify the active selection tool and per tool whether it is visible.

A separate ribbon entry „Selection Tools“ provide further helpful option for special selections.
View Ribbon – Zoom & Aspect Ratio

- To investigate details of the data array, VirtualLab offers the zoom tools. (The mouse wheel enables quick zooming functionality.)

- The user can trigger to
  - Zoom In
  - Zoom Out
  - Show All
  - Zoom Into Selection (if selection is visible)

- The user can also specify the aspect ratio (true to scale or free).
View Ribbon – Copy

• The current visualization of a data array can be copied to clipboard.

• VirtualLab also synchronizes the view setting of the active data array with another open data array.

• This tool is very helpful for comparison purpose and for the generation of presentation material.
Manipulation Ribbon

- The manipulation ribbon offers access to several items to modify the active data array.
- These operations are typically mathematically motivated.
- In addition several conversion tools are available.
- VirtualLab also support to apply Fourier transformation to the active data array.
Manipulation Ribbon – General

- The general part of the manipulation ribbon gives access to tools for the mathematical manipulation of the active data array.
- The user can modify the data values as well as the coordinates defined in the data array.
Manipulation Ribbon – General

Important tools for the manipulations are

• Modification of coordinate and interpolation settings
• Array – Array operations (addition, multiplication, convolution …)
• Operation with constant (addition, raise to power, …)
• Scaling of values (normalization, clipping, …)
• Phase modification (unwrapping, conjugation, …)
• Lateral displacement (mirroring, rotating, transpose, …)
• Array size modification (embedding, period replication, …)
• Sampling manipulation (interpolation, oversampling, …)
• Selection base manipulation (extraction of 1D and 2D selections, …)
• Quantization (hard and soft quantization, …)
Manipulation Ribbon – Conversion

- In the section Conversion the user can trigger to convert the data array into other data formats.
- Currently the following conversions are supported:
  - Bitmap sequence
  - Harmonic Field
  - 1D data array by decomposition
  - 1D data array by separation into x and y direction
Manipulation Ribbon – Fourier Transform

- VirtualLab enables the user to perform numerical and physical Fourier transformations onto equidistant sampled data arrays.
- The user can select whether forward or backward transformation shall be applied.
Detector Ribbon

- To perform numerical evaluations on the active data array the detector tools on the Detector ribbon can be used.
- The detectors which are available for numerical data arrays are only numerically defined. Physical detectors are available for physical objects.
Detector Ribbon – General

- In the general section of the detector several numerical detectors are available.
- The user can select
  - Full width at half maximum
  - Position and value of minimum and maximum within the data array
  - Uniformity error of the numerical data array.
General Ribbon – Selection Related Evaluations

- For active selection tools specific evaluation tools are available.
- Currently here only the sum within selection is available.
- This tool is only active, if the rectangular/elliptical selection is visible for the active data array.
Summary

• The document specific ribbon of the data array
  – enables the user to modify view settings
  – and gives access to a variety of manipulation and evaluation tools.

• The general structure explained within this use case can be applied to a variety of different VirtualLab documents. (For example the view ribbon is typically available for every result window.)