

UseCase.0008 (1.0)

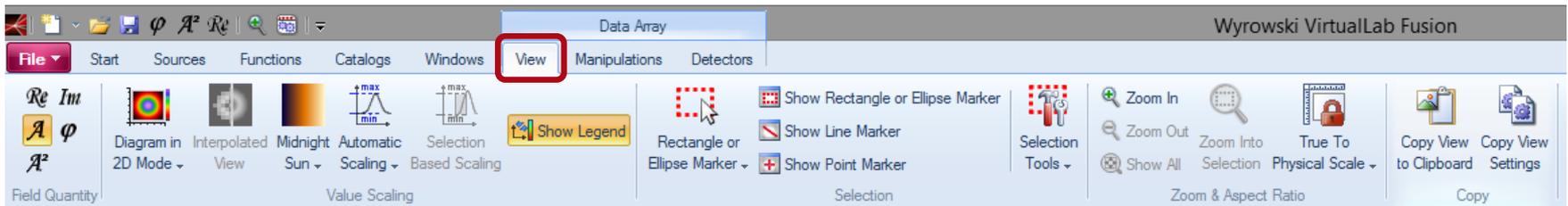
Data Array Ribbons

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

Description

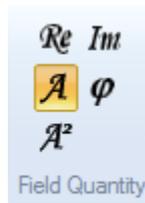
- This use case explains the three document specific ribbons for data arrays (i.e. View, Manipulations, Detectors).
- Data arrays are of central concern within VirtualLab because they are the numerical object for stored data.
- An overview of the view options, manipulation tools and detectors for data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

View Ribbon



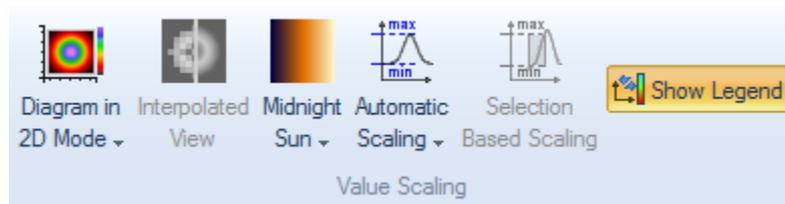
- The view ribbon can be used to set up the view parameters for the visualization of the data array.
- It allows access to the specification of the field quantity to be shown, value scaling, selection tools, zoom and aspect ratio and copy functions.

View Ribbon – Field Quantity



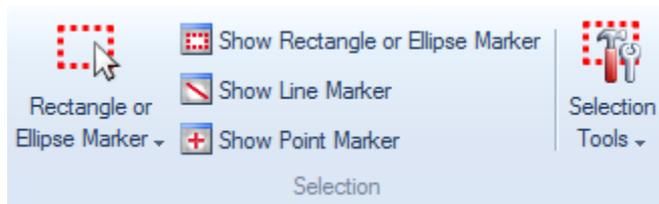
- If the active data array is complex-valued the user can specify the field quantity to be shown.
- The user can select
 - Real Part
 - Imaginary Part
 - Amplitude
 - Phase
 - Squared Amplitude
- For real-valued data arrays this view setting is not available.

View Ribbon – Value Scaling



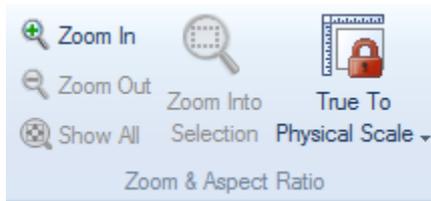
- The user can also specify the value scaling parameters for the view.
- The following parameters are available
 - 2D or 3D visualization
 - Use Interpolated Values
 - Color Lookup Table to Visualize
 - Automatic Scaling / User - defined Scaling (can be triggered selection based)
 - Show/Hide Legend

View Ribbon – Selection



- 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



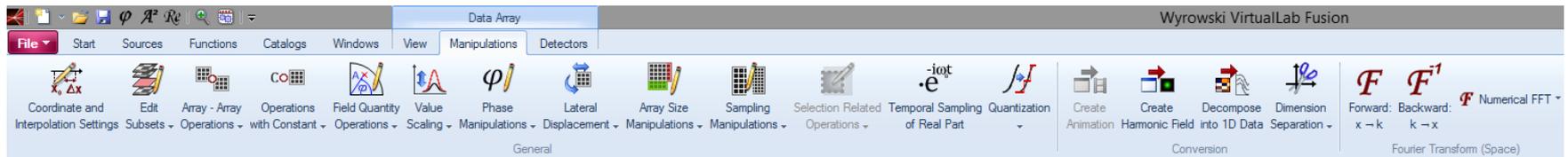
- To investigate details of the data array, VirtualLab offers the zoom tools. (The mouse wheel enables quick zooming functionality.)
- The user can trigger to
 - Zoom In
 - Zoom Out
 - Show All
 - Zoom Into Selection (if selection is visible)
- The user can also specify the aspect ratio (true to scale 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

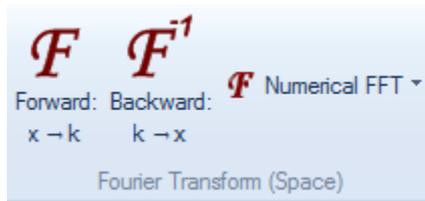
- Modification of coordinate and interpolation settings
- Array – Array operations (addition, multiplication, convolution ...)
- Operation with constant (addition, raise to power, ...)
- Scaling of values (normalization, clipping, ...)
- Phase modification (unwrapping, conjugation, ...)
- Lateral displacement (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



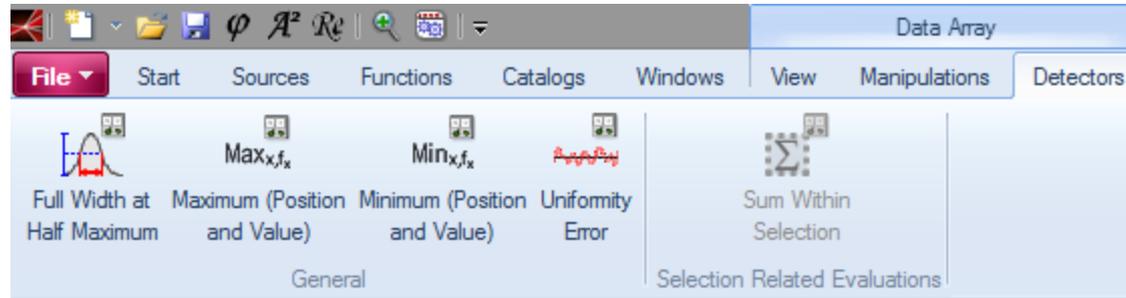
- In the section Conversion the user can trigger to convert the data array into other data formats.
- Currently the following conversions are supported
 - Bitmap sequence
 - Harmonic Field
 - 1D data array by decomposition
 - 1D data array by separation into x and y direction

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.

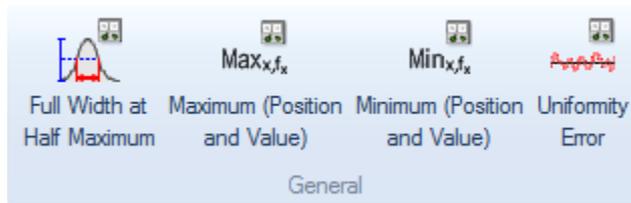
Detector Ribbon



- 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.)