XAL Internal Plotting Package

2010.05.03

A. Shishlo

OAK
RIDGE
National Laboratory

Outline

- **XAL plotting package structure**

- **Graphs Panel**

- **Data**

  – **2D data**

  – **3D – color-surface data**

- **Bar charts extension**

- **Conclusions**

XAL Plotting Package Structure

View-Controller
FunctionGraphsJPanel

Model (data types)
===== 2D ======
BasicGraphData **(slow)**
CubicSplineGraphData
CurveData **(fast)**
===== 3D ======
ColorSurfaceData
SmoothData3D
LinearData3D
PointLike3D
BlackAndWhite3D

BAR-CHARTS
Model (data) - BarColumn
View-Controller - BarChart

OAK
RIDGE
National Laboratory

FunctionGraphsJPanel

Title
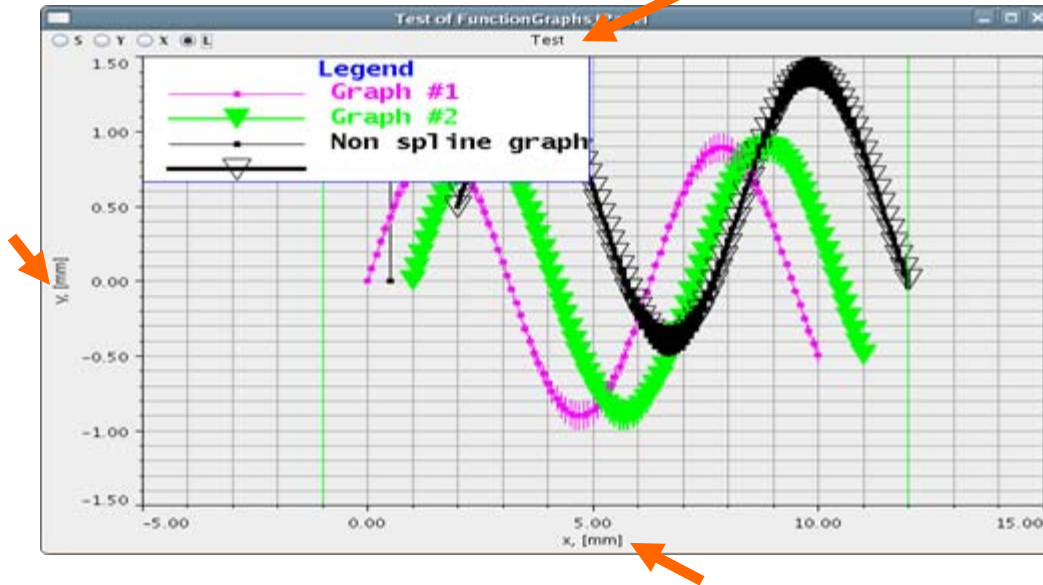
▪**The FunctionGraphsJPanel class is a subclass of JPanel.**

▪**Implements two interfaces to provide interactive capabilities: MouseListener and MouseMotionListener.**

▪**All plotting takes place on the Graphics object of the FunctionGraphsJPanel.**

▪**The three text fields clearly visible on the graphics panel: a graph title and the horizontal and vertical axes titles.**

▪**A user can specify texts, fonts, and colors of the titles, and backgrounds of the graph and surrounding (border) region.**

▪**The grid lines have separate colors and visibility switches (setGridLineColor, setGridLinesVisibleX, setGridLinesVisibleY).**

2D Data

BasicGraphData class (slow)
• The BasicGraphData class represents data as a set of (x, y, error of y) triplets ordered according x values.
• The BasicGraphData class uses the linear interpolation between different x values is used.
• CubicSplineGraphData (subclass) uses spline.

CurveData class (fast)
• The CurveData class represents a set of (x, y) pairs.
• On the graphics panel the adjacent points will be connected by straight lines.
• If a user wants a closed contour the last pair should be the same as the first pair.
• A user can specify a color, thickness, and a stroke width of the line.
• These data are not presented on the legend panel, and therefore they do not have names.
• The simplicity of this data container results in the high performance of plotting.

3D Data

3D Color Surface Data (ColorSurfaceData abstarct base class)

There are four subclasses representing different algorithms of interpolation of the value field defined on a two dimensional rectangular grid.

The implementations of this scheme are:

• "smooth" uses 9-points smooth interpolation. It is used by default.

• "linear" is a linear interpolation inside 4-points.

• "point like" means no interpolation, it uses the nearest point in the grid.

• "black&white" means no interpolation, it uses the nearest point in the grid, and the value can be 0 or 1 only.

All 3D color surface data types are produced by the Data3DFactory class by using the static method getData3D, which returns the ColorSurfaceData instance.

Only one instance of the ColorSurfaceData class can be registered inside the FunctionGraphsJPanel class instance, but it can be combined with CurveData and BasicGraphData instances (actually, combination with BasicGraphData does not make any sense).

OAK
RIDGE
National Laboratory

3D Data

Zoom
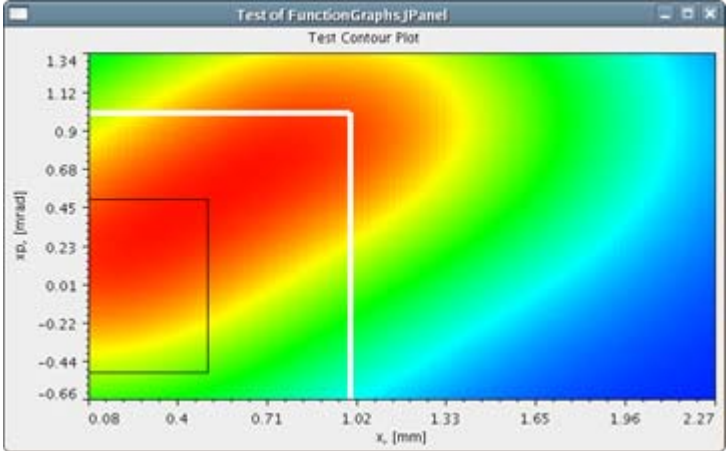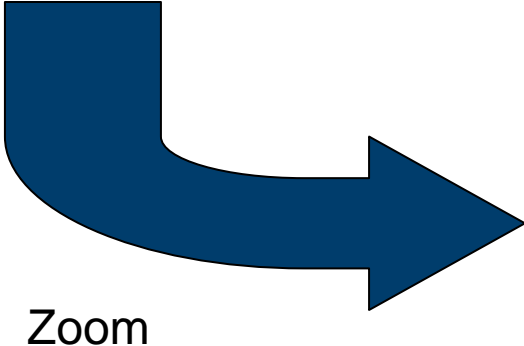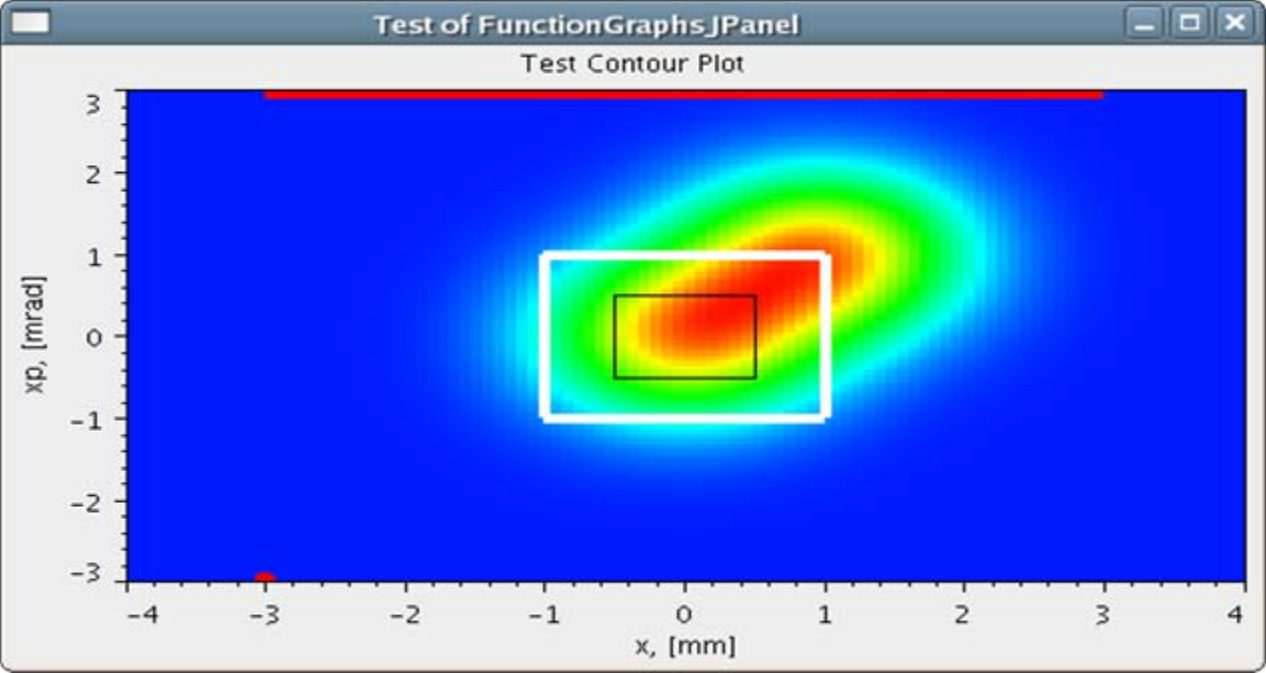
Bar charts extension

BAR-CHARTS

•**To handle the bar-charts there is a "barchart" sub-package. It includes BarChart and BarColumnColor class, and BarColumn interface.**

•**The BarChart class is a wrapper around the FunctionGraphsJPanel class that creates set of CurveData instances to show the data defined by a Vector of BarColumn instances.**

•**The user has to implement the BarColumn interface to use this bar-chart plotting..**
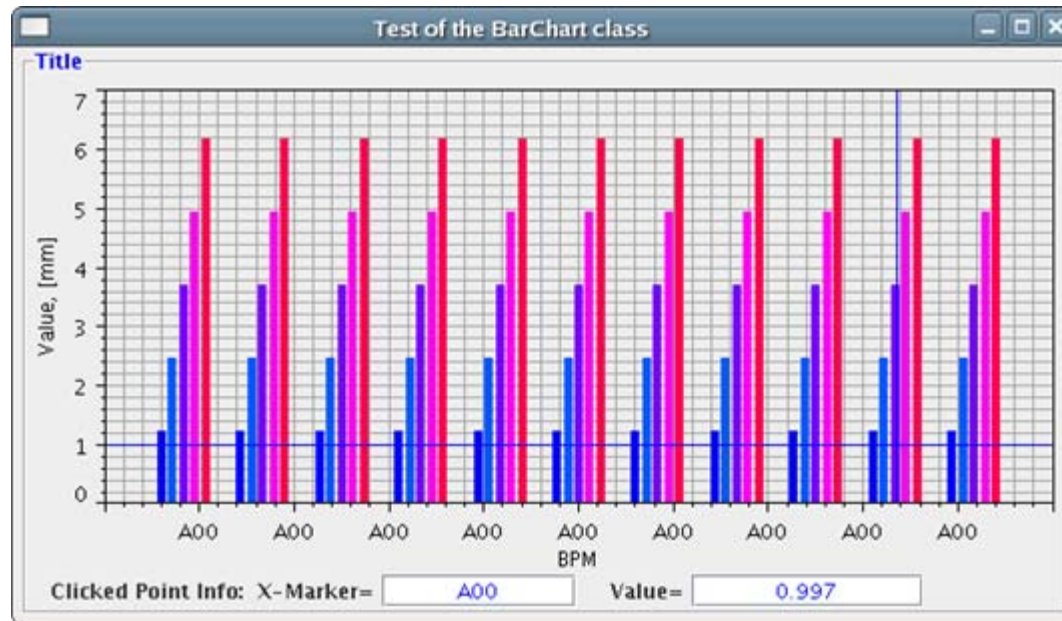
Conclusions

- Despite of simplicity of the plotting package residing inside XAL it is capable to satisfy basic demands from XAL applications and provides a satisfactory level of interactivity.

OAK RIDGE
National Laboratory