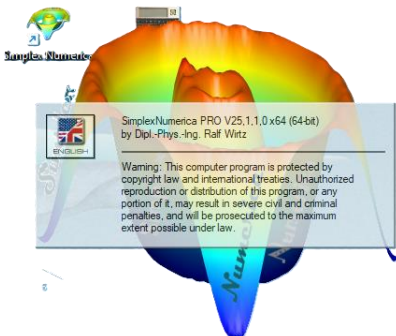
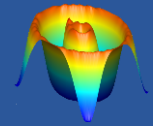


Info to SimplexNumerica

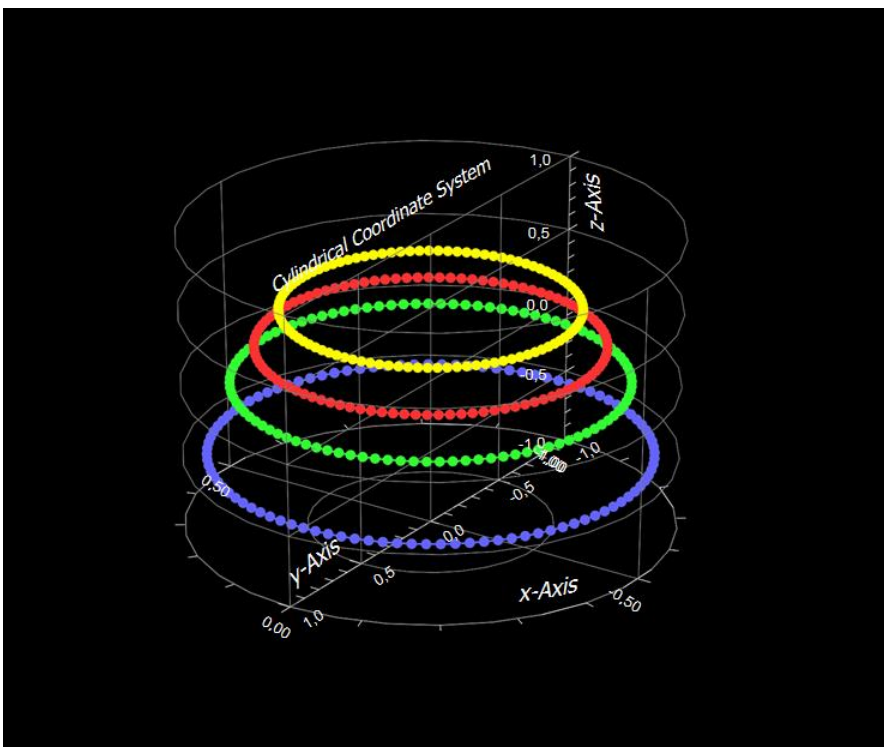
Release Notes for Upgrade V25



SimplexNumerica is a software that can be used to visualize and analyze data sets in various ways. It has many features and tools for data analysis, such as data manipulation, data plotting, data fitting, and statistical analysis. It also supports the import of various data formats, such as database, spreadsheet and text files. With *SimplexNumerica*, you can create custom data visualizations, analyze data using statistical methods, and export the results to various formats. In addition, the software can be used to create attractive charts, graphs and diagrams. *SimplexNumerica* has been designed to make complicated numerical

math applied to big data analysis very simple, in conjunction with an outstanding chart library. The software also allows you to develop programs in the C++ scripting language, and provides many sample scripts and examples for learning and reference. *SimplexNumerica* is a versatile and powerful software for data analysis and visualization, and can be used in various fields and applications. You can download it for free from [here](#) or read more about it from [here](#), [here](#) or [here](#).

This document describes the enhancements and changes in the brand new *SimplexNumerica* V25 release and summarizes features from previous releases.



SimplexNumerica V25 has been developed with a focus on the (so called) **Dark Mode**. All charts from the *Thumbnail Window* have been updated to this modern view of applications. In particular, the three-dimensional part of the program for creating high-quality 3D charts has been renewed.

The new version has more than 100 general types of charts for 2D/3D data arrays. All charts and graphic views can be exported to various file formats, as everything is based on the SimplexGraphics vector interface.

You can do whatever you want with your data using the easy-to-use

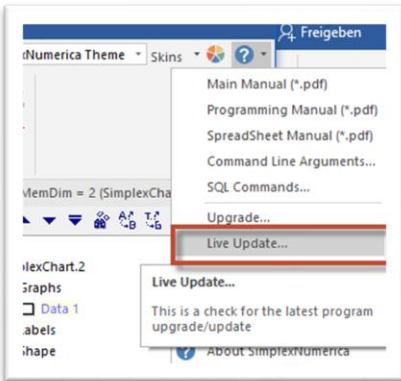
ribbon menus along with the context-sensitive property window and the Excel-like spreadsheet. For automation, you can program routines using the C++ scripting language based on *AngelScript*¹.

Dark Mode has several new types of transparency and smoothing lightning, but the colors of the page, charts, shapes, and objects can still be customized by the user...

¹ AngelScript is a powerful object-oriented C/C++ like scripting language from Andreas Jönsson at AngelCode

Release Notes for Upgrade V25

Download



You can download SimplexNumerica V25 for 64-bit Windows 10/11 here (32-bit upon request):

https://drive.google.com/uc?export=download&id=12z_wXzDXBRv9L1nlhg-70lbUV_nUGlb8

Then use the 'Live Update' menu item to update within the program. If the program detects during 'Live Update' a major new release version (like V25.x.0.0), then it refers to the main download page:

<https://www.simplexnumerica.com/download/>

... or use the link above to download the updated base version. Here how it works:

Live Update (Minor new release version, e.g. V25.0.3.4)

You can make a live update from Pulldownmenu Help -> Live Update...

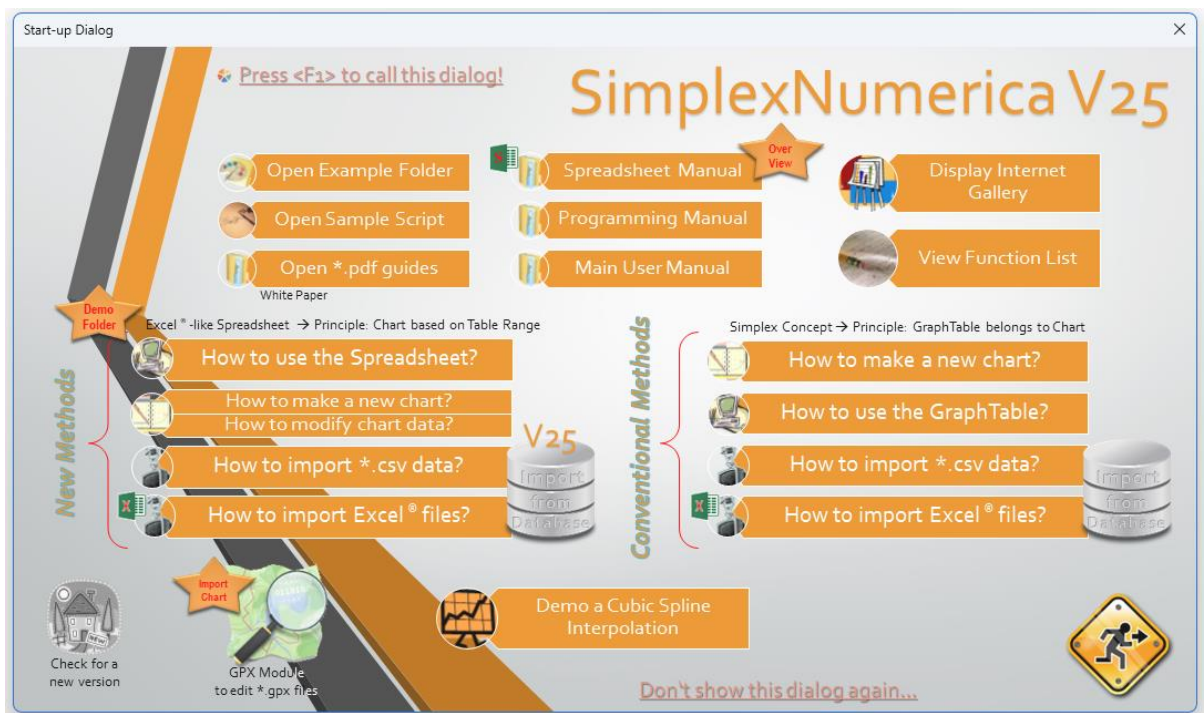
A 'Live Update' only re-installs the components that have been changed. To do this, however, it needs the right installed base version!

Upgrade (Major new base release version, e.g. V25.1.0.0)

But, if you do an 'Upgrade...' (see on the left picture the menu point above 'Live Update...'), then it loads the latest version in the user folder and starts the installer. If there was found a previous version, then a message box pops-up with the hint to first de-install the previous version. Let the message box open and go to the Control Panel and **de-install the previous version**. Then go next in the installer procedure...

Help

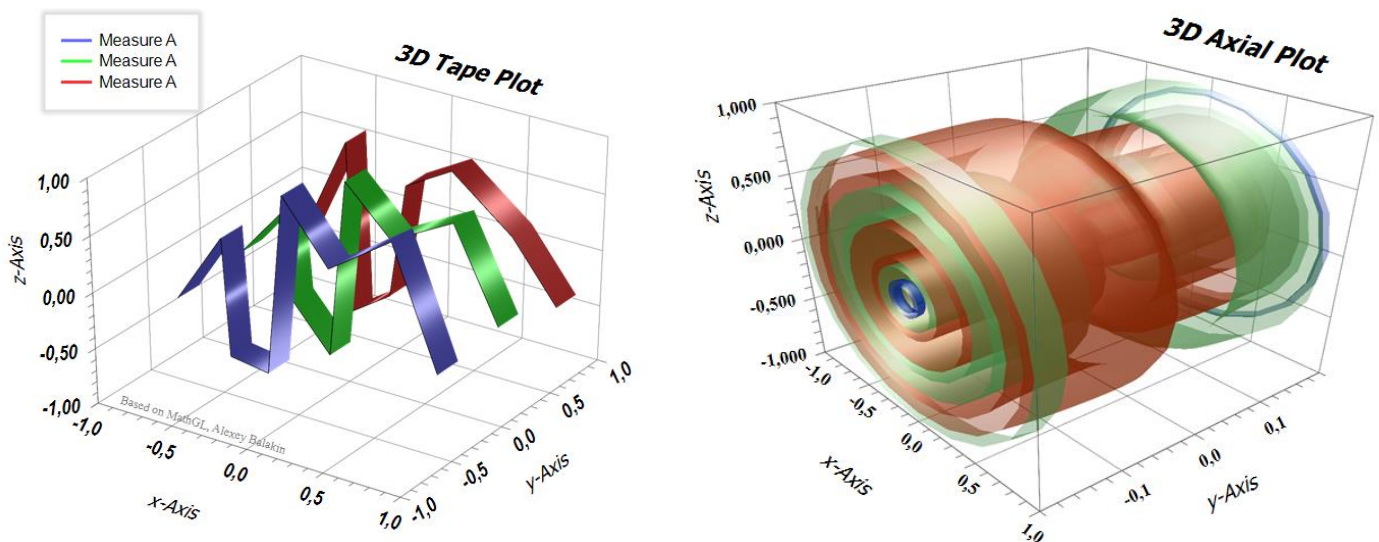
Press <F1> and you get help from this wizard dialog:



Release Notes for Upgrade V25

3D Plots

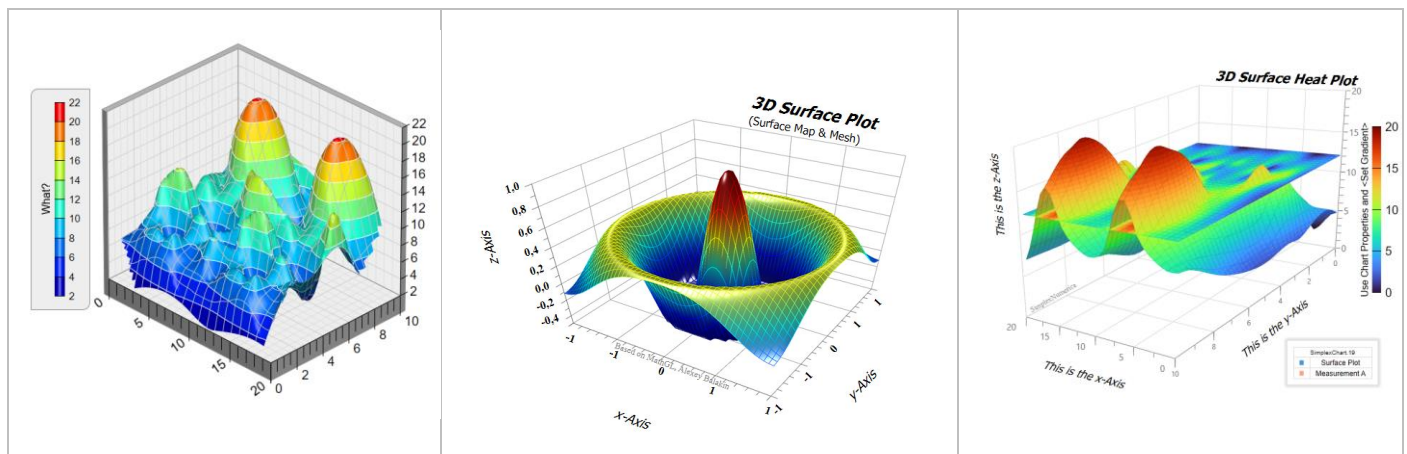
Three-dimensional (3-D) plots can be a useful way to present data that consists of more than two variables. *SimplexNumerica* provides various options for displaying three-dimensional data, like line and wire, surface, mesh plots, and many others. The plots can also be formatted to have a specific appearance and special effects.



Surface plots are charts of three-dimensional data. Rather than showing the individual data points, surface plots show a functional relationship between a designated dependent variable (y-Axis), and two independent variables (x-Axis and z-Axis). The plot is a companion plot to the Contour Plot.

It is important to understand how these plots are constructed. A two-dimensional grid of x and y is constructed. The range of this grid is equal to the range of the data. Next, a z value is calculated for each grid point. This z value is like a weighted average of all data values that are "near" this grid point. But, to make it more precisely, *SimplexNumerica* used a triangulation or interpolation algorithm to find the best approach to the data. The three-dimensional Surface Plot is constructed using these fit values. Hence, the Surface Plot does not show the variation at each grid point. For that, you should use a 3D Scatter Plot.

Here three different chart types for Surface Plots:



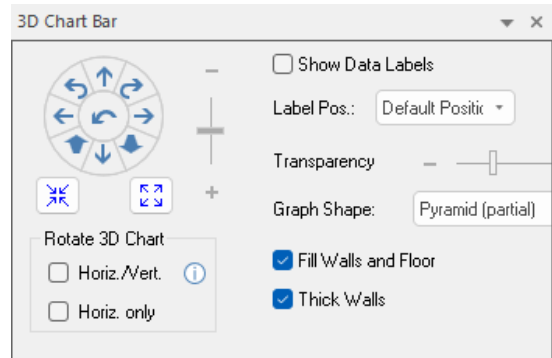
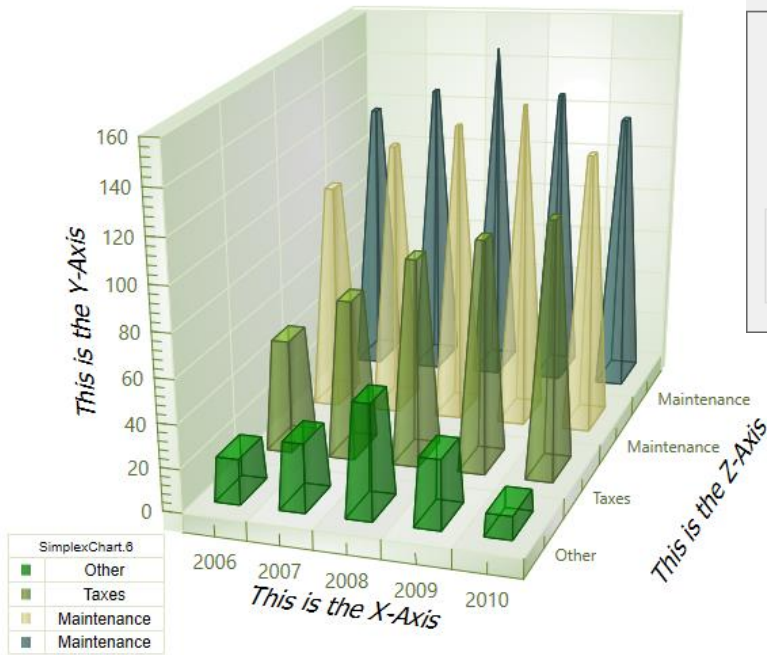
Release Notes for Upgrade V25

3D Chart Bar

SimplexNumerica V25 has a new window for 3D graphics. For example, you can rotate 3D charts freely in the canvas or you can set the transparency, filling walls and floors immediately, etc.

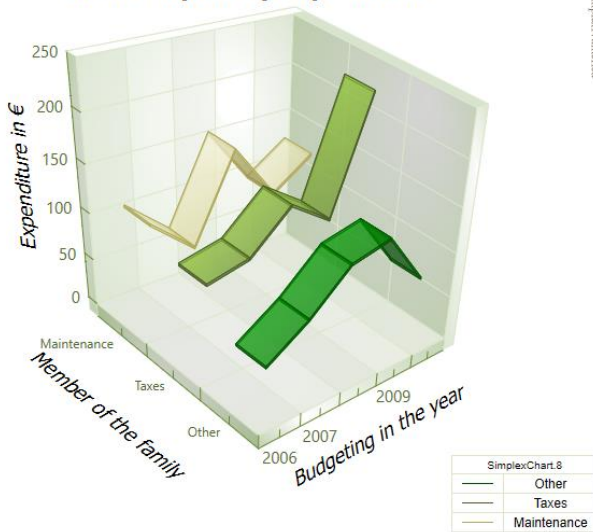
SimplexNumerica

This is the header (Header 1)

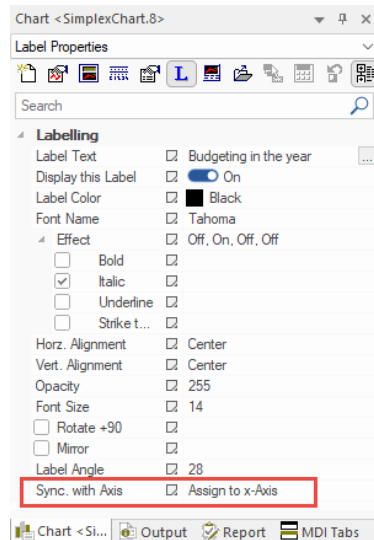


For example, to rotate a chart, click on the 'Horiz. Only' check box, move to the canvas and press the left mouse button to rotate the chart in horizontal directions, only.

Non-compulsory Expenditure

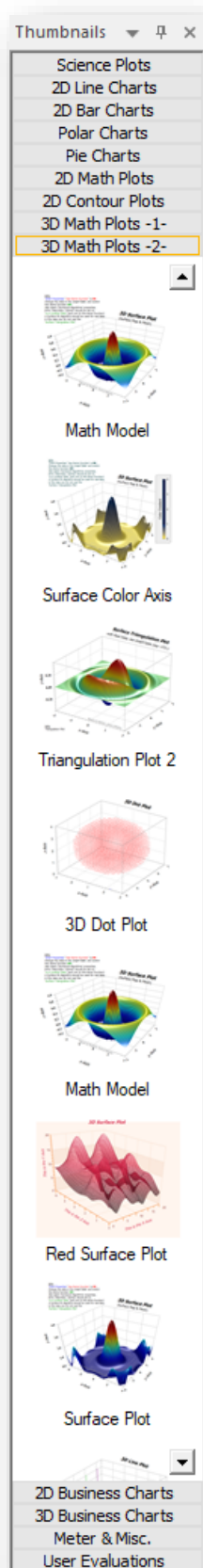


To rotate the axis legend text as well, set the 'Sync. with Axis' property.



Release Notes for Upgrade V25

Demo Mode / Real Mode



To have a nicer impression, *SimplexNumerica* shows - in the Thumbnail Window - some of the pictures based on the demo mode. In demo mode, the data are right generated by a mathematical function, like

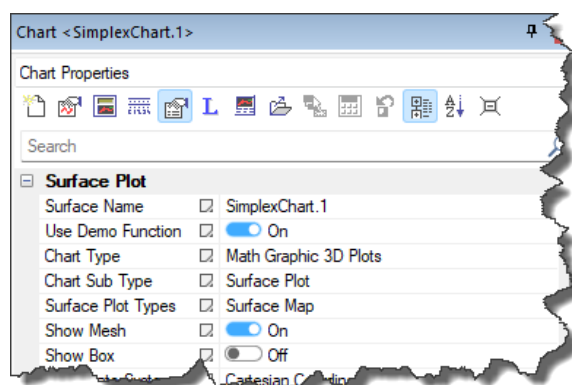
$$f(x, y) = 0.6 * \sin(2 * \pi * x) * \sin(3 * \pi * y) + 0.4 * \cos(3 * \pi * x * y); // \pi = \text{PI} = 3.14$$

Here the Thumbnail Window (expanded in the width) that shows the rubric *3D Math Plots* (page 2)

As you can see, there are many symbols with different settings for a Surface Plot and other related chart types.

To switch-off the demo mode, use the properties:

1. If 'Chart Properties' 'Use Demo Function' is ON



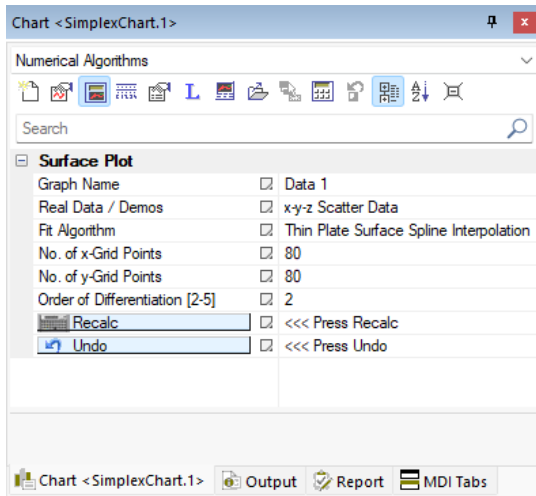
2. Change the data in the GraphTable and then switch the demo function OFF.

Legend	G0.x	G0.y	G0.z
1	-0,997	-0,705	0,4980
2	0,127	0,899	-0,7924
3	-0,613	-0,717	-0,1376
4	0,618	0,810	-0,2752
31	-0,668	0,669	-0,0025
32	0,326	-0,930	-0,7582
33	-0,098	0,034	0,0085
34	-0,296	0,326	-0,0188
35	-0,886	-0,148	0,7631
36	0,215	-0,791	-0,5787
37	0,567	0,899	-0,4866
38	0,605	0,843	-0,3440
39	0,215	-0,791	-0,5787
40	-0,886	-0,148	0,7631

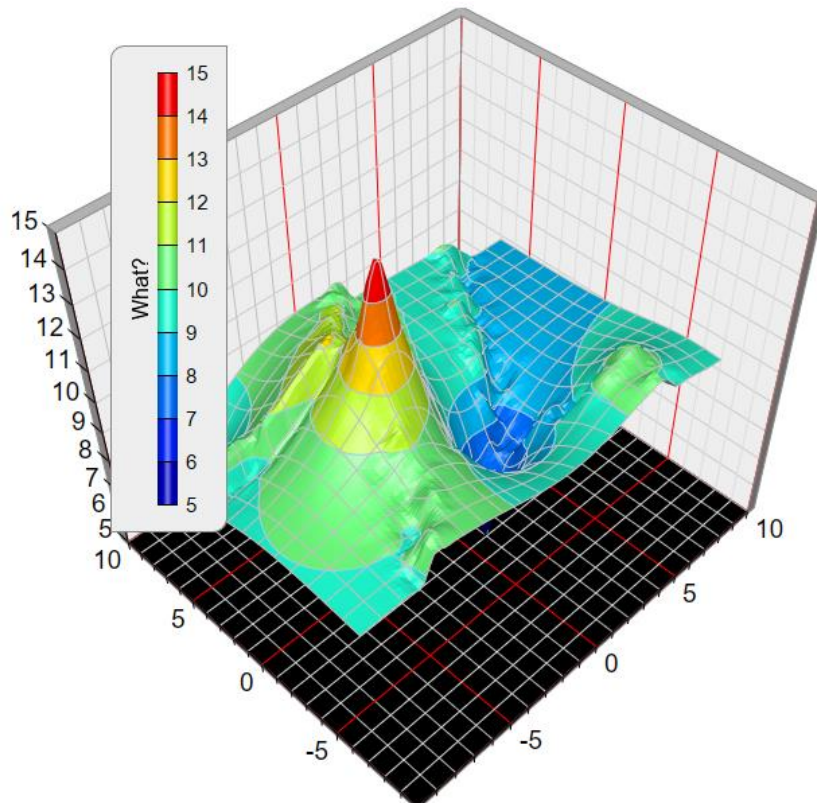
Edit your x/y/z data and go back to the Graphics View (key <F3>)

Release Notes for Upgrade V25

3. Select 'Numerical Algorithms' properties.

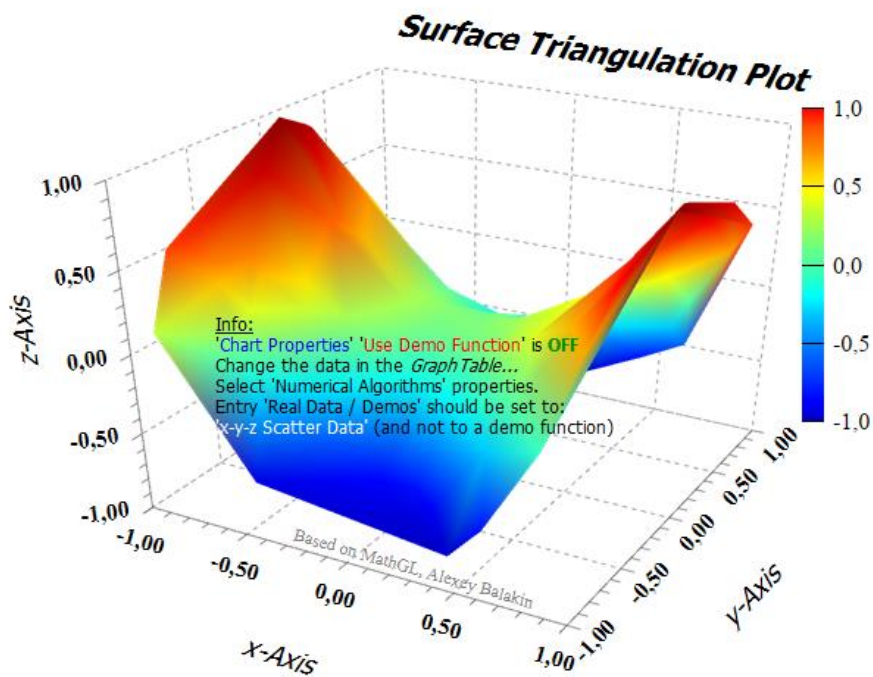


4. Entry 'Real Data / Demos' should be set to: '**x-y-z Scatter Data**' (and not to this demo function)
5. A Surface Fit Algorithm should be used for real data, in the case you do not use the 'Surface Triangulation Plot'
6. Press button '**Recalc**'



This picture above shows real data interpolated by the '**Built-in Spline Interpolation**'

Release Notes for Upgrade V25



Another method to fit real data is by using the '**Surface Triangulation Plot**'

By using the 'Surface Triangulation Plot' no interpolation is needed.

A triangulation of a compact surface is a finite collection of triangles that cover the surface in such a way that every point on the surface is in a triangle, and the intersection of any two triangles is either void, a common edge or a common vertex. A triangulated surface is also called tri-surface.

Release Notes for Upgrade V25

Data Structure

A surface plot is constructed from three variables. The x and y (independent) variables are shown on the horizontal axes. The z variable is shown along the vertical axis. Note that all three variables are (numeric) real values (in C++ the *double* type).

Here is how *SimplexNumerica* calculates a Surface Plot from a mathematical (demo) function (in C++):

```
//Info: d3_xmin/d3_xmax are the chart border x limits; dto. for y-Axis
// Dim of the Grid Points
long NumberOfXDataPoints = 50; // get this from your program...
long NumberOfYDataPoints = 40;

double d3_xmin, d3_xmax, d3_ymin, d3_ymax;
// get this from your program...

for (long j = 0; j < NumberOfYDataPoints; j++)
{
    double y = d3_ymin + j * ((d3_ymax - d3_ymin) / (NumberOfYDataPoints - 1));

    for (long i = 0; i < NumberOfXDataPoints; i++)
    {
        double x = d3_xmin + i * ((d3_xmax - d3_xmin) / (NumberOfXDataPoints - 1));

        long i0 = i + NumberOfXDataPoints * j;

        double z = Get3DZValueFromFunction(SelectedSurface, x, y);

        //
        // Proceed with x, y, z...
        //
    }
}

double Get3DZValueFromFunction(_tagSurfaceFunctionNames SelectedSurface, double x, double y)
{
    double zValue;

    try
    {
        switch (SelectedSurface)
        {
            case surface_math_a:
                zValue = 0.6 * sin(2 * M_PI * x) * sin(3 * M_PI * y) + 0.4 * cos(3 * M_PI * x * y);
                break;
            case ...
                // more examples....
        }
    }
    catch
    {
        //....
    }

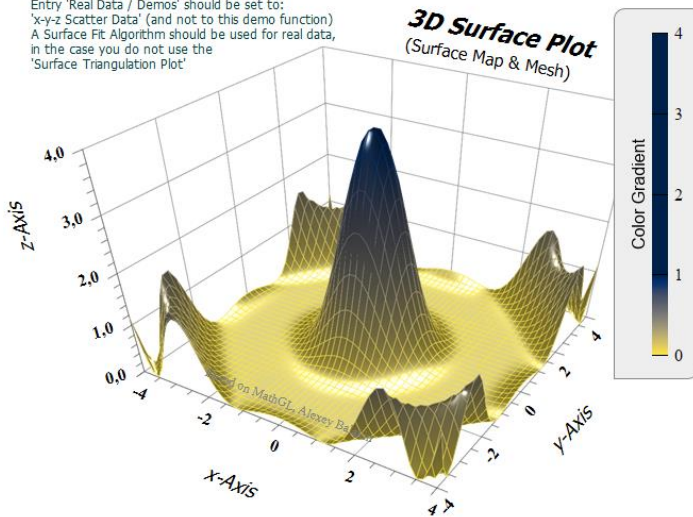
    zValue = __max(zValue, g.surface_interval.d3_zmin);
    zValue = __min(zValue, g.surface_interval.d3_zmax);

    return zValue;
}
```


Release Notes for Upgrade V25

Examples

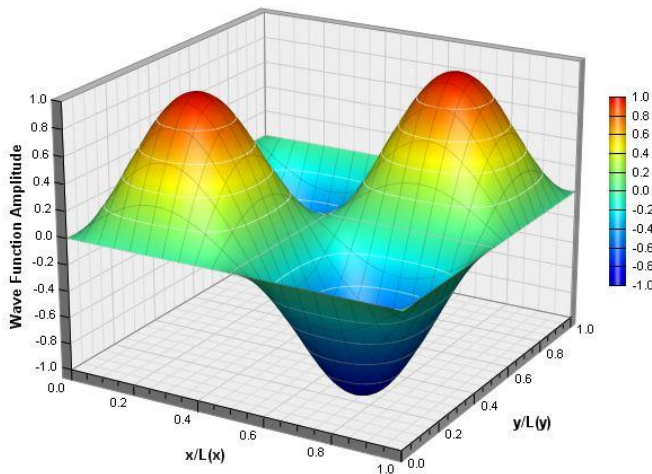
Info:
"Chart Properties" "Use Demo Function" is **ON**
Change the data in the *Graph Table* and switch the demo function **OFF**.
Also select "Numerical Algorithms" properties.
Entry "Real Data / Demos" should be set to:
'x-y-z Scatter Data' (and not to this demo function)
A Surface Fit Algorithm should be used for real data,
in the case you do not use the
'Surface Triangulation Plot'



Here are some examples of 3D plots integrated into SimplexNumerica, but please have a look at the 3D thumbnail window in SimplexNumerica, there you will find many more 3D variations.

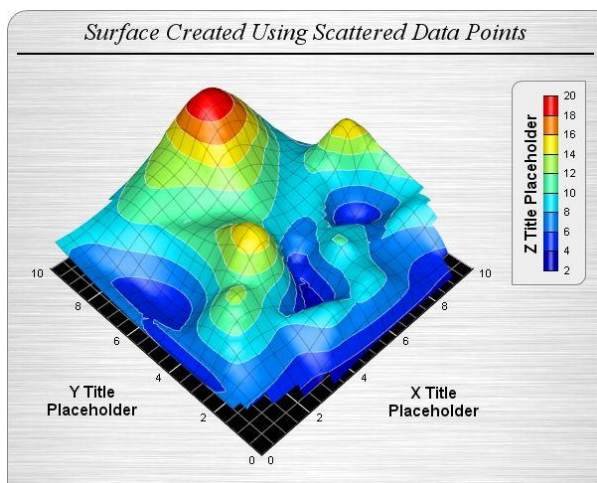
A surface chart with lighting effects. The smooth surface is created using spline surface fitting of the data points.

Quantum Wave Function



A surface chart with continuous coloring and lighting effects, and with white contour lines and grey grid lines. The smooth surface is created using spline surface fitting of the data points.

Surface Created Using Scattered Data Points



A surface chart created using scattered data (data points are randomly distributed rather than lying on a grid), with the vertical walls hidden.

Release Notes for Upgrade V25

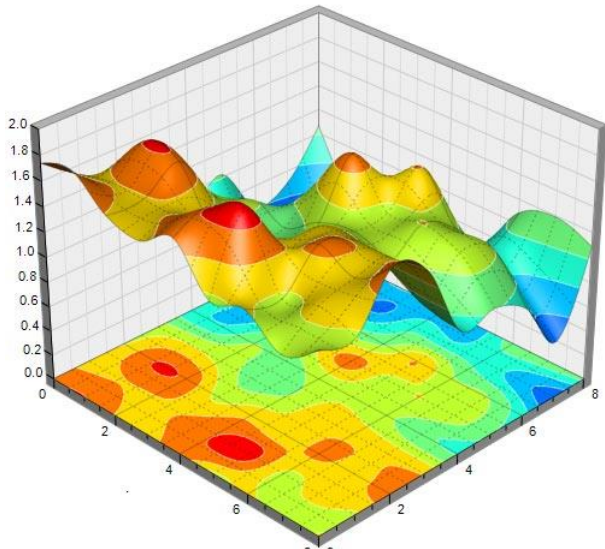
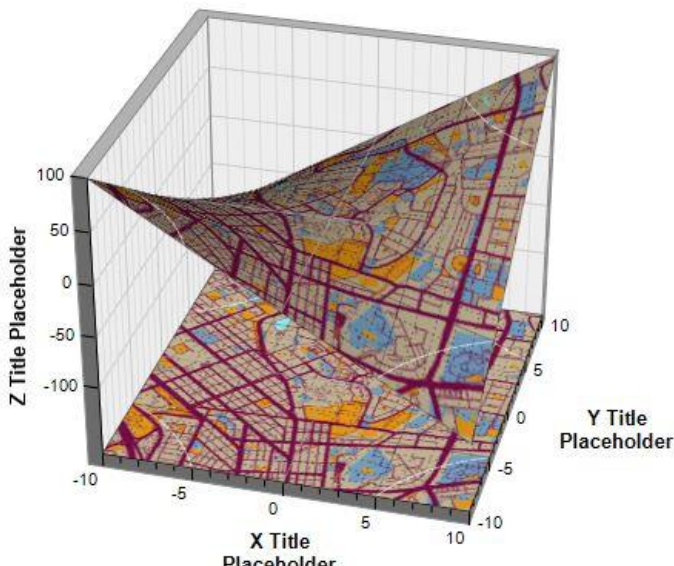


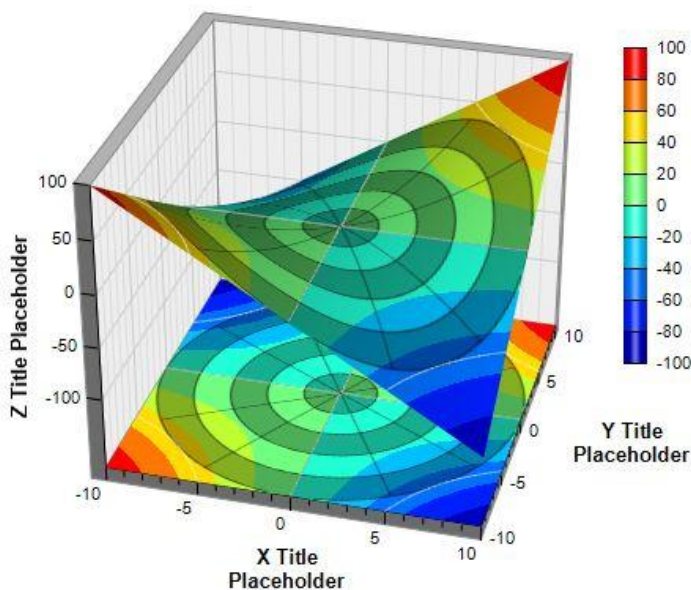
Image Texture

Surface Projection: The surface can be projected onto the XY plane to visualize the contour chart of the surface.



Polar Chart Texture

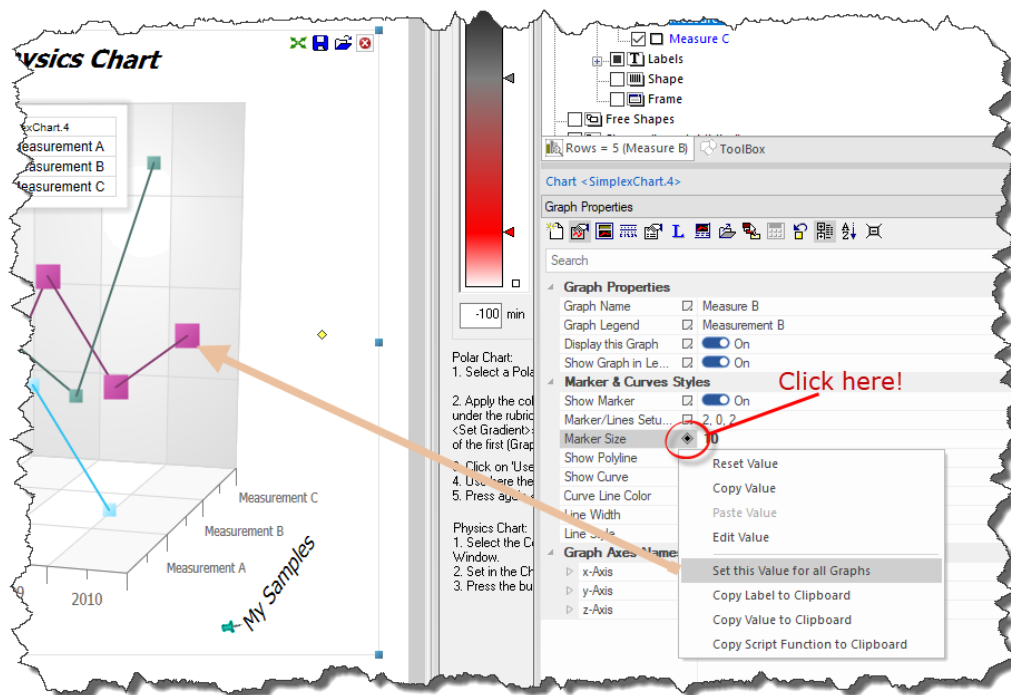
Custom Surface Texture: For maximum flexibility, you can overlay a custom image on the surface. With this method, you can color the surface in any way you like.



Dynamic Image as Texture: The texture image can be dynamically generated. In this example, a semi-transparent polar chart is overlaid on the surface.

Release Notes for Upgrade V25

Set this Value for all Graphs



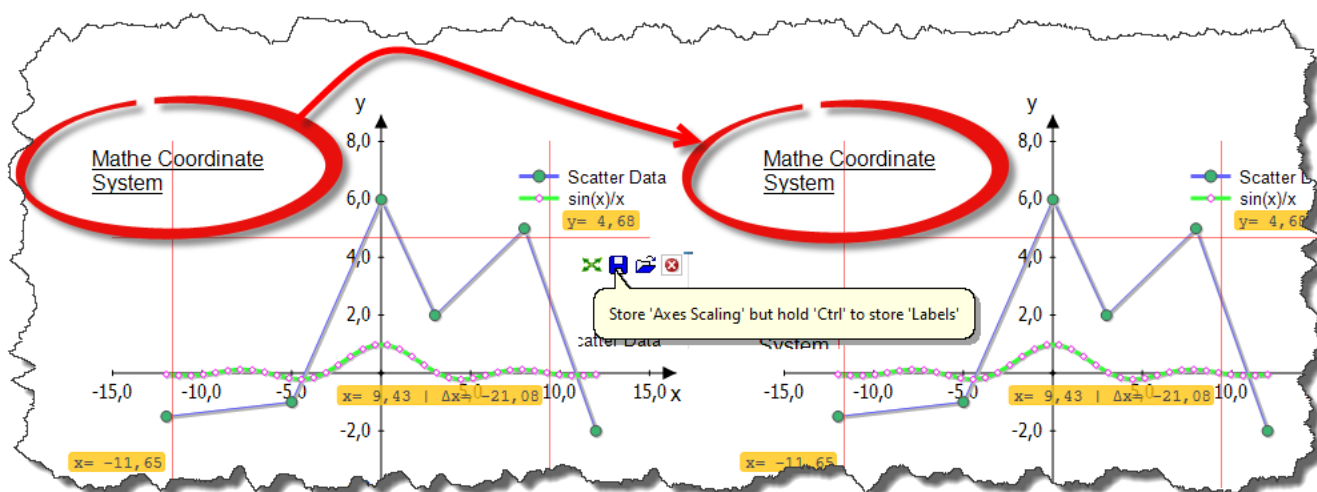
Often you want to set the same value (like the Marker Size) to all Graphs...

You can do that by Left Mouse click on the rhombus icon and choose in the popupmenu the entry **Set this Value for all Graphs**

Store/Load Axes Scaling & Labels

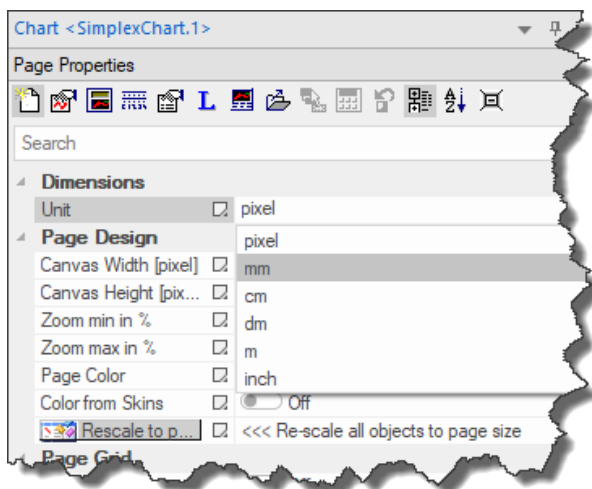
When you have prepared a chart with labels and axes scaling, then you can apply that to other charts, also on other windows/views.

Click on the icon **Store 'Axes Scaling'** but hold 'Ctrl' to store 'Labels' and then on another chart click on the load icon **Load 'Axes Scaling'** but hold 'Ctrl' to load 'Labels'

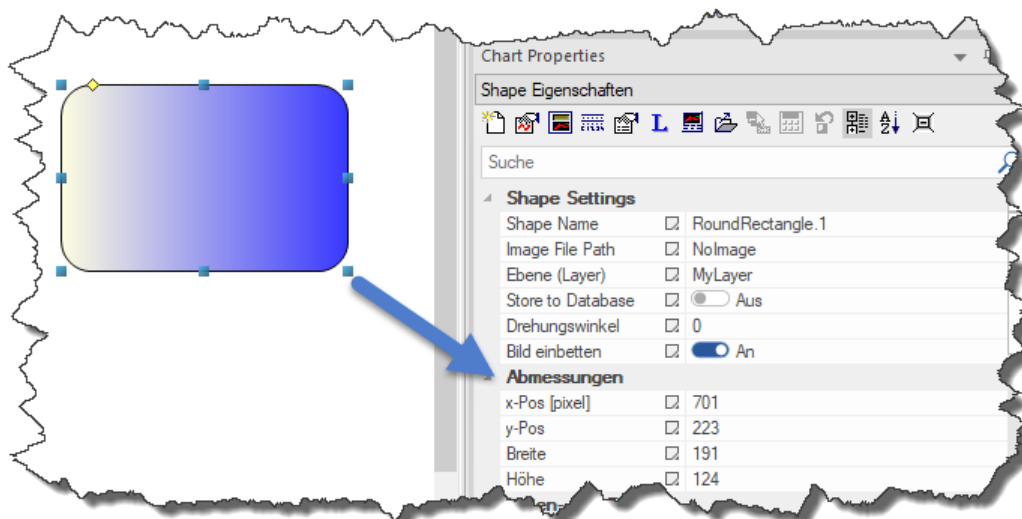


Release Notes for Upgrade V25

Unit of the Dimensions

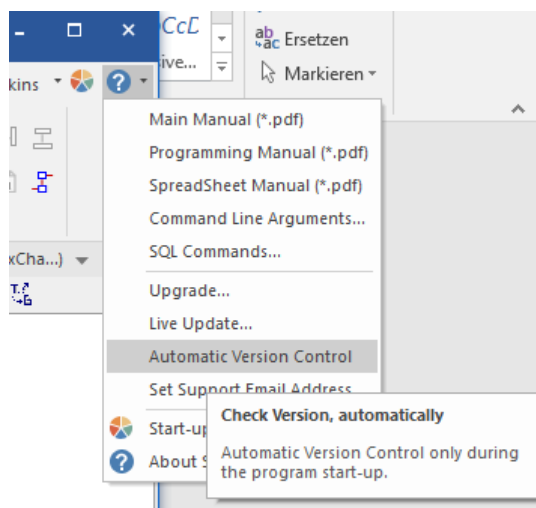


Now, you can set the Units of the shape dimensions in the upper combobox of the page properties.



The adjusted Unit (here pixel) is shown behind the entry „x-Pos“. It is also valid for the other settings.

Automatic Version Control



Checkmark the entry ‚Automatic Version Control‘ if you want to check the latest released program version, automatically.

The program will do that shortly after the program start.

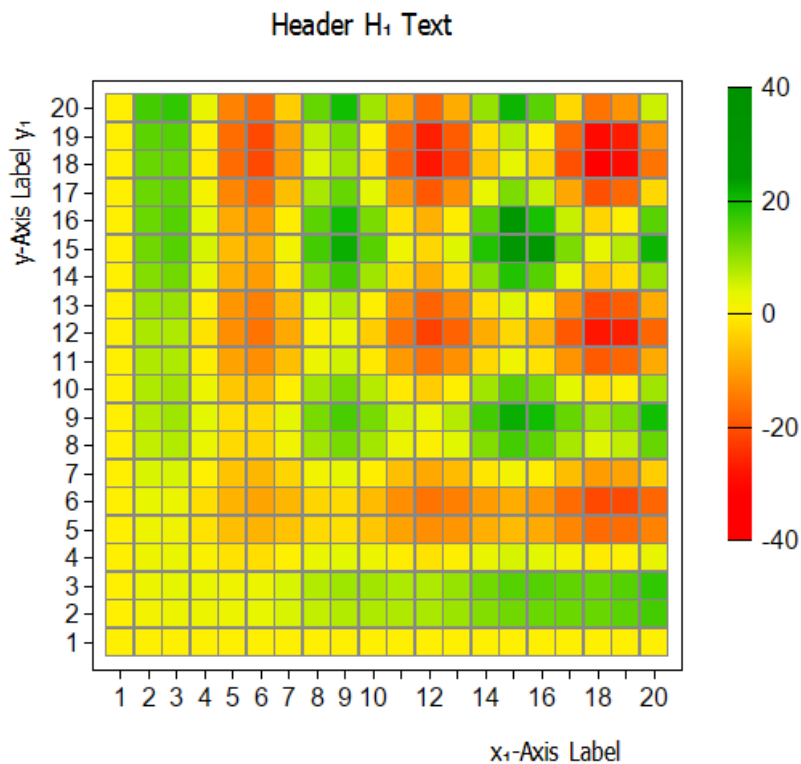
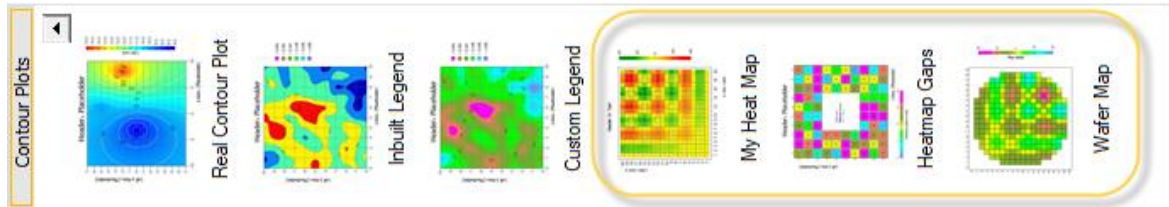
If this entry is not checked, then call the upper update menu points manually.

Release Notes for Upgrade V25

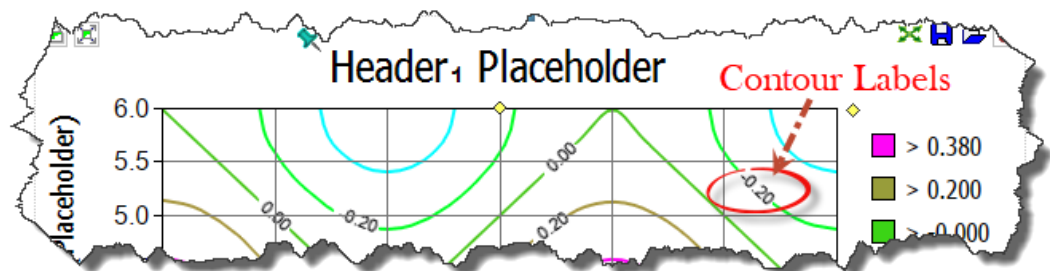
Contour Plots & Heatmaps

A heatmap depicts values for a main variable of interest across two axis variables as a grid of colored squares. The axis variables are divided into ranges like a bar chart or histogram, and each cell's color indicates the value of the main variable in the corresponding cell range.

You can find some heatmaps in the Thumbnail Window *Contour Plots*



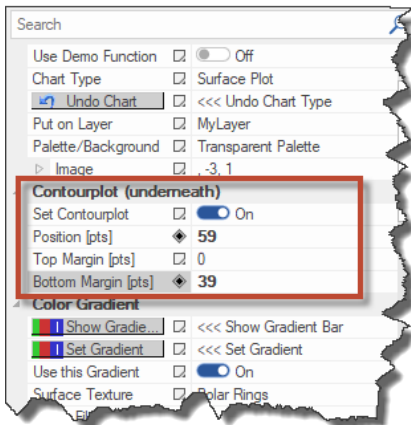
SimplexNumerica can now draw labels along the contours in a contour chart. This allows contour values to be displayed directly on the contours, instead of having to lookup their values based on the underlying colors.



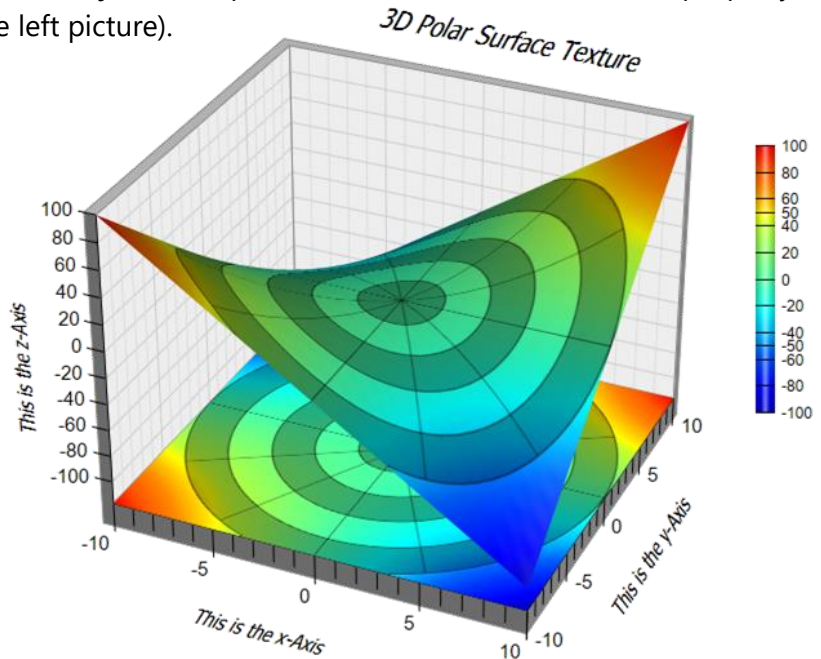
Release Notes for Upgrade V25

Contour Plot under Surface Plot

The projection of a Surface Plot on the XY plane is a Contour Plot. SimplexNumerica can now include the projection on the XY wall of the Surface Plot.

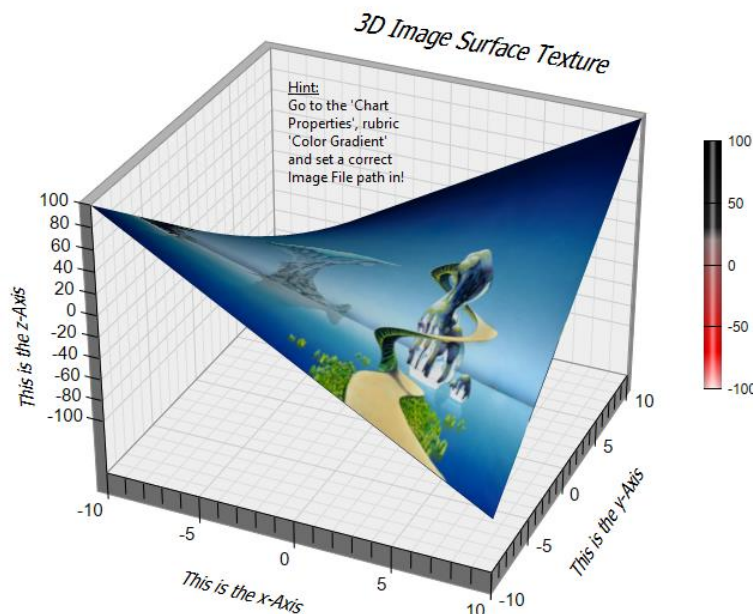


You can adjust the z-position of the Contour Plot in the property section (see left picture).



Surface Texture

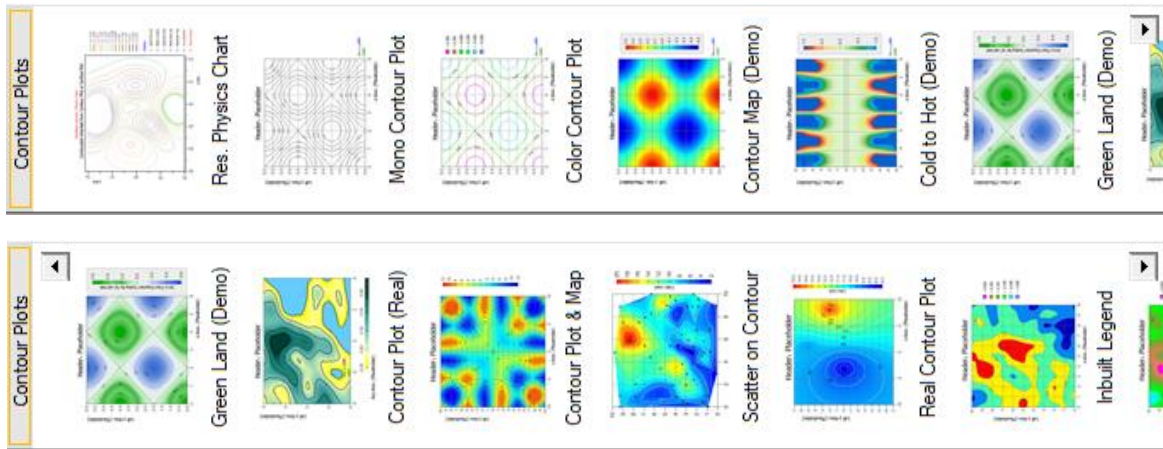
SimplexNumerica now supports drawing a custom image on the surface of a surface chart. The image can be semi-transparent so as not to block the underlying surface. The image can be generated on the fly by loading a user defined image file (from disk). This feature is useful for adding custom annotations on the chart. In the above example it shows a polar chart as the image to include semi-transparent circular zones on the chart.



Release Notes for Upgrade V25

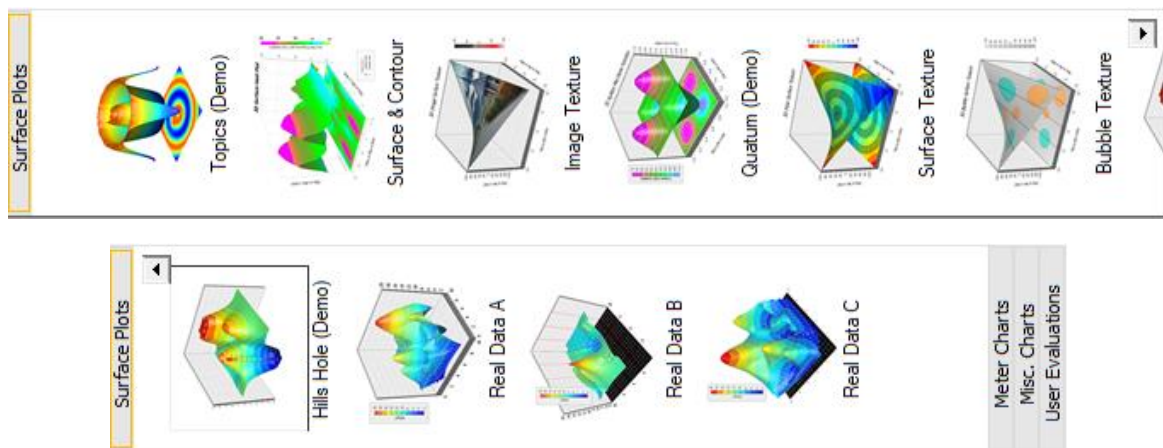
Contour Plot Thumbnails

Here are some of the new Contour Plot thumbnails:

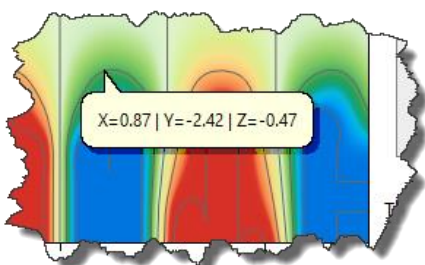


Surface Plot Thumbnails

Here are some of the new Surface Plot thumbnails:



Tooltips



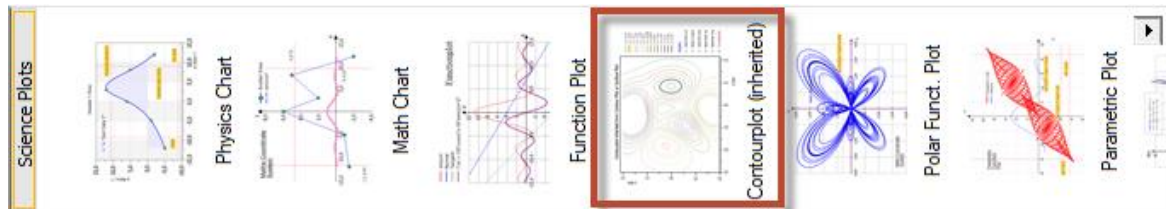
Tooltips for Contour Plots and Surface Plots are available now.

Release Notes for Upgrade V25

Inherited Contour Plot

The disadvantage of the main Contour Plots was (still is) the fact that the contour curves are not accessible as individual graphs.

Now, we made a separate algorithm that converts the contour lines into the *Physics Chart* as separate Graphs. We call that an *Inherited Contour Plot*.



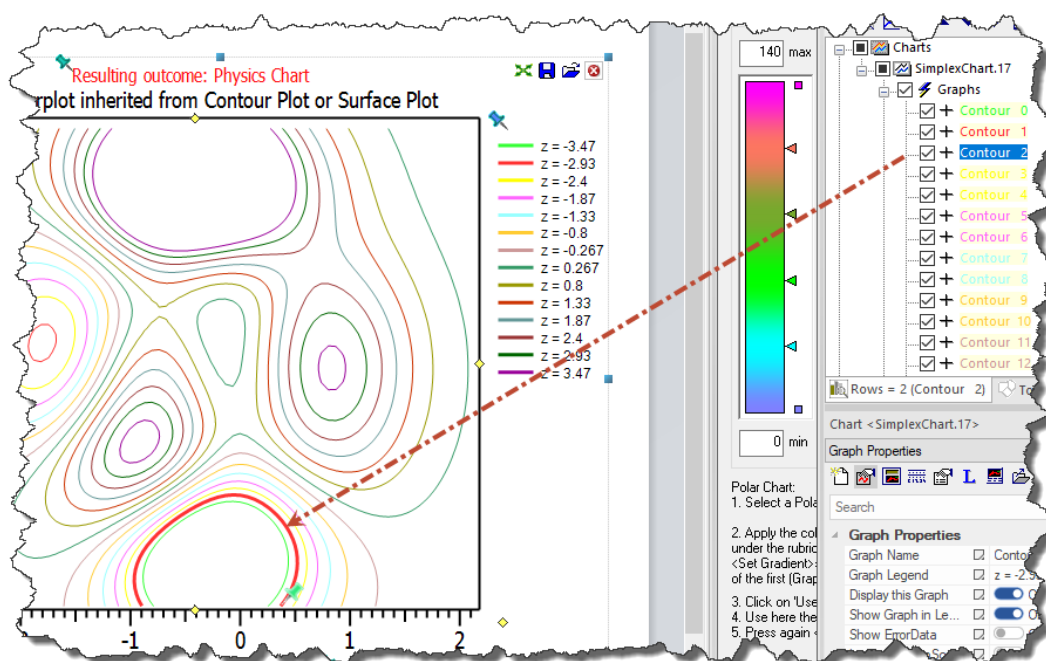
Then you can select/de-select each Graph in the Chart Explorer, as usual:

Here the strategy for doing that:

1. Select from Contour Plots or Surface Plots Thumbnails (TN) a chart (not this one!).
2. Make a Contour Plot Chart, edit Property 'Max. No. of Contour Levels'
3. Select the Contour Plot Chart in the Graphics View
4. When finish, then select TN 'Science Plots' the icon 'Physics Chart' or
5. Ribbonbar 'Chart' Icon 'Exchange Chart', 'Graph Plots', 'Linear Cartesian'
6. You will get this chart here!
7. Check/Uncheck the Graphs in the Chart Explorer

Hint:

If the algorithm makes a small mistake by a curve, then uncheck this Graph in the Chart Explorer!

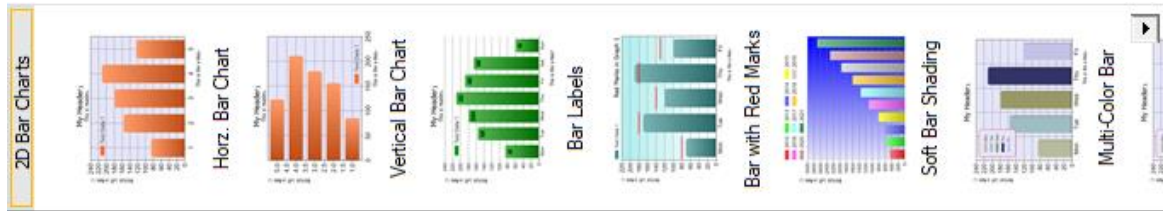


Release Notes for Upgrade V25

The colors of the Graph curves are taken from the Gradient during build of the Contour Plot!

Bar Chart Thumbnails

The bar charts have also been expanded a little bit. Here are some of the new bar Chart thumbnails:



Gradient Coloring

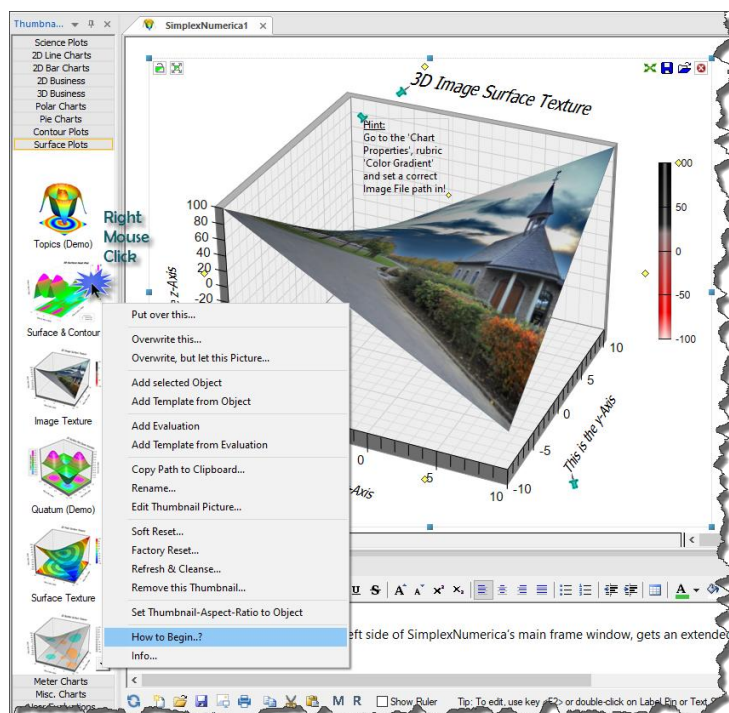
SimplexNumerica V21 supports multi-segment gradient colors in more charts.

Text Rendering Change

SimplexNumerica V21 uses a new text rendering engine with more accurate text positioning for some 2D/3D charts.

Thumbnail Window

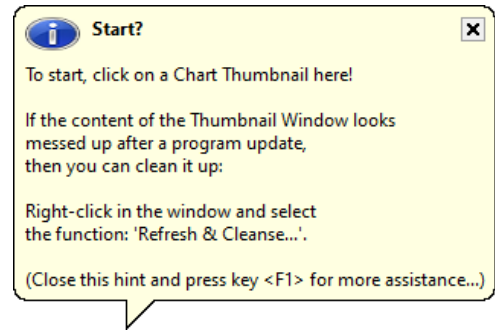
This window, normally placed on the left side of SimplexNumerica's main frame window, got an extended popupmenu with more functionality. Call it by right mouse click on any icon or on the white background of the thumbnail window.



Release Notes for Upgrade V25

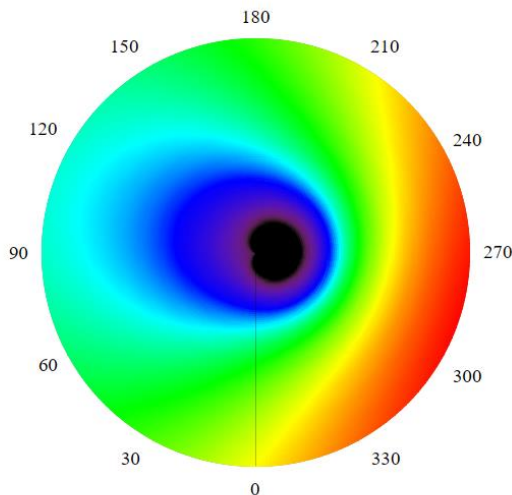
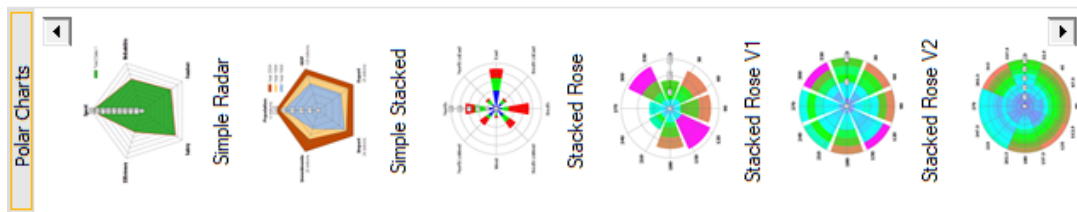
The entry 'How to begin?' reminds you:

If you did not have de-installed the old version, then it can happen that the thumbnail icons are jumbled or twice available or whatever, because the setup program has installed the new version over the previous ones where the thumbnails are differently sorted. To fix this, you can use the 'Refresh & Cleanse' menu on the popumenu.

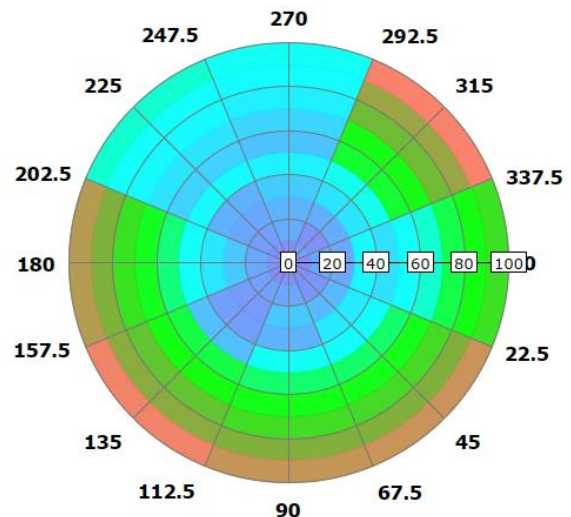


Polar Chart with Color Gradient

The Polar Charts have also been expanded with color gradients.



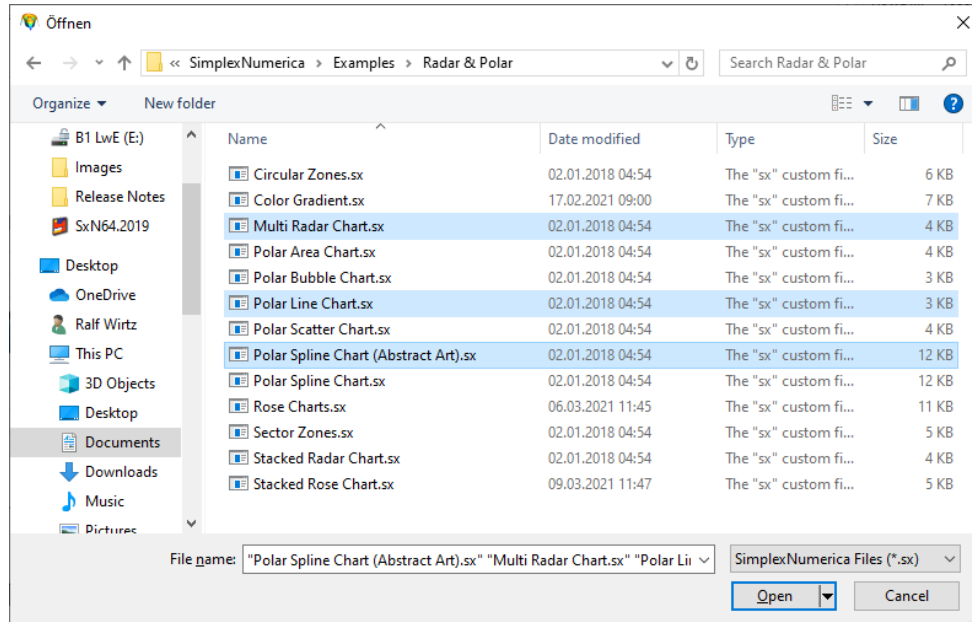
Gradient Polar Charts



Release Notes for Upgrade V25

Open more Evaluations to the same time

Now, you can load several evaluations at the same time. Select/Mark the files in the Explorer as usual and click open...

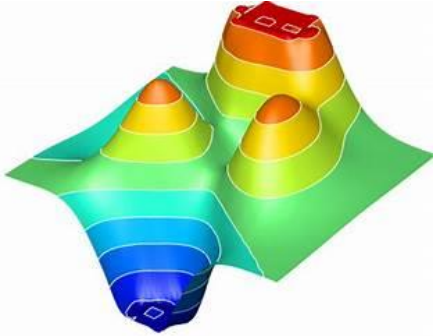


More...

This is only an excerpt from the many improvements in the new SimplexNumerica V21. Please download it and have a look to the extended separate manuals...

Release Notes for Upgrade V25

About...



SimplexNumerica is a nicely polished, detailed tool that allows you to plot and analyze various data in all kinds of ways. SimplexNumerica can create detailed charts, graphs and all kinds of visual utilities for data analysis.

SimplexNumerica is a very popular program in the scientific community because it offers a lot of different utilities for presenting the desired data.

The program is based on ergonomic programming and it has been converted into Microsoft Windows state-of-the-art UI that offers guidelines with ribbon bars, contextual dialogs and interactive graphs that help and make handling numerical mathematics easier.

SimplexNumerica is one of the best programs for publication type graphics, arbitrary data analysis, measurement data presentation and more.

A special application that is integrated into SimplexNumerica is its Simplexety add-on. This add-on really lives up to its name and can be described as a highly advanced calculator that can be used for everything from basic math to solving complex problems. With this tool, you can solve some of the most complex equations in just a few clicks that would otherwise take you a long time to write down on paper or in some other application.

SimplexNumerica is an incredibly detailed program with a fully customizable interface and a great application for anyone who needs to work with large amounts of data. It is amazingly deep and has a large number of tools for researchers and scientists or passionate data lovers.

Currently, SimplexNumerica is available as a free to try download for all software users with all its functionality. After 30 days SimplexNumerica will be downgraded to a freeware version with a banner on top, but still with the full functionality of the full version.

The program is available in English, French and German (switchable during runtime). Full information about the product's features can be found on the developer's website:

www.simplexnumerica.com