

INTRODUCTION

Release Notes Avizo 7.1.0-beta1

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This document describes the improvements and new features in version 7.1 of Avizo, the 3D visualization Software for Scientific and Industrial data.

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OVERVIEW

Avizo 7.1 is a minor release of the Avizo product family including some important new extensions and features, enhancements of the user interface, performance improvements and issues fixes.

NEW PRODUCT IN AVIZO XLAB EXTENSIONS FAMILY

XLab Diffusion (Molecular Diffusivity)

XLab Diffusion is a new extension of Avizo Fire software, which provides numerical simulation capabilities to calculate molecular diffusivity of a porous media, from a scanned sample (CT, FIB/SEM, MRI, etc.). XLab Diffusion directly computes material properties from the segmented 3D image. The Fick's second equation is solved using a finite volume method, with no need to extract a 3D mesh.

Two new modules are provided with this extension:

- **Molecular Diffusivity Tensor Calculation**
The diffusivity tensor is computed from volume averaging method applied to Fick's second equation. The studied sample is considered representative of a larger scale material, allowing imposing periodic boundary conditions. The diffusivity tensor provides additional information about the intensity of diffusivity along any direction of space. It can reveal anisotropy of the porous media as the dependence of the diffusivity on the direction of concentration gradient.
- **Molecular Diffusivity Experiment Simulation**
An experiment is simulated, by adding reservoirs with imposed initial concentrations at the two opposed input and output faces of the given sample, and by hermetically closing it on the four other faces to guide the diffusion along one single direction.

The calculation considers diffusion of a single species in a fluid phase filled with a solvent where there is no flow, with no diffusion in the solid phase.

See Avizo XLab User's Guide for more information. XLab Diffusion is available on Windows XP/Vista/7 64-Bit.

XLab Electro (Electrical Resistivity / Formation Factor)

XLab Electro is a new extension of Avizo Fire software, which provides numerical simulation capabilities to calculate electrical resistivity (formation factor) of a porous media, from a scanned sample (CT, FIB/SEM, MRI, etc.).

XLab Electro directly computes material properties from the segmented 3D image. The Ohm's equation is solved using a finite volume method, with no need to extract a 3D mesh.

Two new modules are provided with this extension:

- **Formation Factor Tensor Calculation**
The electrical resistivity (formation factor) tensor is computed from volume averaging method applied to Ohm's equation. The studied sample is considered representative of a larger scale material, allowing imposing periodic boundary conditions. The resistivity tensor provides additional information about the intensity of resistivity along any direction of space. It can reveal anisotropy of the porous media as the dependence of the resistivity on the direction of potential difference.
- **Formation Factor Experiment Simulation**

An experiment is simulated, by imposing a potential difference to two opposed input and output faces of the given sample and by insulating the sample from outside on the four other faces.

The calculation considers resistivity of a single fluid phase filled with a solution conducting electricity where there is no flow, with an insulating solid phase.

See Avizo XLab User's Guide for more information. XLab Electro is available on Windows XP/Vista/7 64-Bit.

AVIZO ALL EDITIONS - IMPROVEMENTS AND NEW FEATURES

See also below in this document improvements and new features for specific Avizo Editions.

NEW FEATURES

New Animation Producer

The Animation Producer is a powerful replacement for the familiar Demo Maker module. It allows creating and tuning key frame animations and demos with an intuitive timeline panel. You can start the Animation Producer by pressing the *clap button* in the main toolbar, or by selecting *Animation Producer* in the *Window* main menu. With the default layout, the Animation Producer window appears docked below the viewer window. You will also notice *chrono icons* added next to components such as modules, ports and viewers. You then compose an animation by moving the orange time cursor in the extensible timeline, then use chrono icons to add an event in the key frame event tracks, and add or modify events in the event tracks once they have been added below the timeline. You can zoom and pan the timeline. The remote control buttons allows playing the animation, or setting time cursor to the next or previous event.

To create a movie, you will toggle the *tape button* in the Animation Producer panel, near the 'remote control' buttons, that will show the Movie Maker interface.

You can create multiple new animations and select any as the *current animation*.

With default settings, when loading an existing project, the contained Demo Maker modules remain hidden in the project view and are automatically converted into Animation Producer content. This can be disabled in the Preferences General panel, by checking the option "Use Legacy Demo Maker".

USER INTERFACE ENHANCEMENTS

Extended Colormap port, superseding Data Window port (linear mapping type)

The Data Window range slider port, that was available in modules such as Ortho Slice, is now superseded by a Colormap port. Colormap ports have been extended to support the same features as the former Data Window range slider port: histogram displayed in background (Avizo Fire edition only) and subrange buttons. Note that colormap ports support reversible ranges (left value bigger than right value). For instance, while dragging a subrange button, when crossing the other subrange button, the colormap appears reversed.

When loading existing projects, the Data Window ports are automatically replaced by equivalent Colormap ports (set with grayscale colormap and *local range* mode).

Colormap Editor - selected data and colormap

Since Avizo 7, the display of selected data object is updated when modifying the colormap in the Colormap Editor or when selecting a new colormap in the *Colormap* menu of the Colormap Editor. This now also applies to LDA data.

For editing the colormap of a given display module or data object, simply select it in the project view or using the viewer's pick tool: the corresponding *Colormap* and *Data* menu items are then set in the Colormap Editor.

If the data object shown in the Colormap Editor's *Data* menu has a shared colormap, all display modules attached to this data object are affected by the colormap change. Otherwise, the first display module that has been selected in the project view and is attached to the data object is affected by the colormap change.

FILE FORMATS ENHANCEMENTS

New reader for .vgi and .xtekct files

Two new readers have been added for volume description files such as created by GE Phoenix X-ray or Nikon Metrology CT scanners. All information items stored in header files are attached as data parameters (see Data Parameter Editor in Avizo User's Guide). As for other formats, when the input volume size exceeds a threshold that can be defined in Preferences (LDA tab), you can choose among three options:

- Read complete volume into memory
- Read as external disk data, loading data on demand for instance for quick data preview with Ortho Slice display or sub-volume extraction
- Convert to LDA (Large Data Access) optimized multi-resolution format, allowing for instance fast roaming and visualization with arbitrary slices or volume rendering, selection of region of interest and sub-volume extraction.

OTHER ENHANCEMENTS

Enhanced support for shadows

Most display modules such as Ortho Slice, (Oblique) Slice, and Isosurface now support shadowing.

New Surface View display mode – colorfield mapping type

Surfaces can now be textured by 3D volumes (uniform scalar fields).

A new port *Colorfield mapping type* selects the way colors are mapped onto surfaces, when the optional colorfield data input port is used. With *per vertex* mapping, the input colorfield is evaluated at the surface vertices and colors will be interpolated in between within the surface triangles. Colorfield mapping precision is therefore limited by vertices density of the surface. With the new *per voxel* mapping, textures are used to sample the input colorfield and map it accurately within surface triangles, potentially at the expense of higher memory consumption and lower performances. Note that surfaces can be simplified by using the Simplification Editor.

Curve Editor enhancement: new auto-trace editing mode

A new editing mode option *auto-trace* has been added to the Curve Editor. When *auto-trace* option is enabled, the Curve Editor adds a *Module* input port that can be attached to an Ortho Slice module. The curve path being edited is then automatically fitted to the image edges of the attached Ortho Slice. Curves can be created for instance by main menu *Create > Curve*, or by 3D images menu *Display > Curved Slice*.

New TCL commands for Surface Editor

New TCL commands have been added for the Surface Editor: *flipEdge*, *fixIntersection*, *fixDihedralAngle*, *fixTetraQuality* and *prepareTetraGen*.

New TCL commands *setIconColor*

A new TCL command *setIconColor* has been added for modules and data objects (HxObject).

This command can be used at any time to change the color of the icon which represents object instance in the project view and properties area. It can also be used in resource files to define the color used for icons when creating objects of a given type.

PERFORMANCE IMPROVEMENTS

Surface rendering optimized

Rendering performance of geometric surfaces has been dramatically improved. This impacts in particular Surface View and Isosurface modules, for shaded, outline, transparent or shadowed rendering.

The former rendering mode may still be enabled in the Preferences rendering panel, by checking *Legacy Surface Rendering* option.

The new surface rendering avoids memory consumption overhead and initial render delay tight to the former "Optimize graphics performance" mode. At the same time performance is higher in particular for large surfaces. Performance is even dramatically higher compared to the former "Reduce memory consumption" default mode.

AVIZO FIRE EDITION - IMPROVEMENTS AND NEW FEATURES

See also above in this document the improvements and new features common to all Avizo Editions.

NEW FEATURES

New module Ruled Surface

This new module builds a Surface from two input curves by joining them together by a set of triangles. The input curves can be either Line Set or B-Spline data. The resulting surface is a ruled surface. Ruled Surface is available in the menu *Compute*. Volume data can be mapped onto surfaces (see above *Surface new colorfield mapping type*) and a new Extract Image module is available to create flattened images of ruled surfaces with mapped colorfield.

New module Curve Morphing

This new module interpolates two input curves of type Line Set or B-Spline. Curve Morphing is available in menu *Compute*. This can be used in combination with Curved Slice or Ruled Surface modules for animating a sampling surface.

New module Extract Image for ruled surfaces

This new module can attach to a Surface View module displaying a surface that has been generated by the module *Ruled Surface*, with *per voxel* colorfield mapping. *Extract Image* can then create a flattened 2D image of the input surface with mapped colorfield.

OTHER ENHANCEMENTS

New `getMeasure` TCL command for measure callouts

A new TCL command `getMeasure` is now available for measure items to retrieve the current value of the measure as displayed in the callout beside title. Use `"Measurement" GUI getItemLabels` to retrieve the list of measure objects.

AVIZO XSCREEN - IMPROVEMENTS

Avizo XScreen enhancements

A number of issues have been improved in this release.

AVIZO XPAND - CHANGES

Changed port constructors

WARNING: The method signature for port constructors was changed for localization support.
For instance, port initialization looked like this in previous versions:

```
portRange(this,"range",2) // two float fields
```

Now, you need to specify the port's label via Qt method as follow:

```
portRange(this,"range",QApplication::translate("MyModule", "Range"),2)
```

Simplified Visual Studio requirements - OpenMP disabled in debug mode

Avizo XPand packages are no more dependent on OpenMP by default, which required using Visual Studio Professional Edition with Avizo XPand. You can now use Visual Studio 2008 Standard Edition or Visual Studio 2008 Express with Avizo XPand.