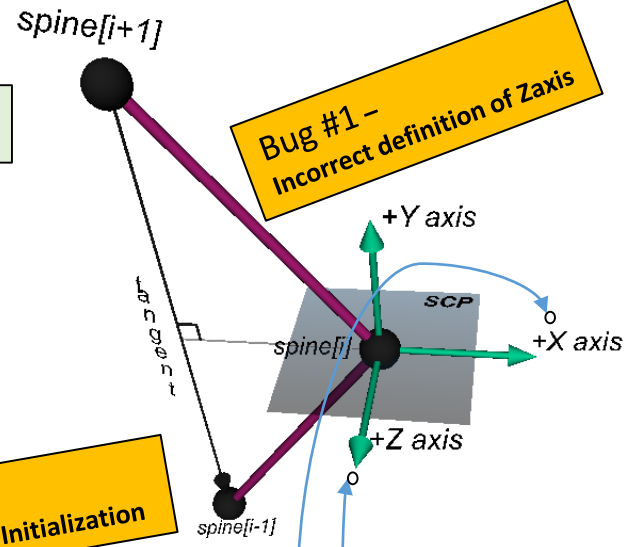


# BugFix for Extrusion Node at Xj3D Viewer

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Oct. 31 ~ Nov. 9

Break down TRANSFORM matrix defined in calculateSCP()



$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} tx_{00} & tx_{01} & tx_{02} \\ tx_{10} & tx_{11} & tx_{12} \\ tx_{20} & tx_{21} & tx_{22} \end{pmatrix} \begin{pmatrix} vfCrossSection_x \\ 0 \\ vfCrossSection_y \end{pmatrix} + \begin{pmatrix} spine[i]_x \\ spine[i]_y \\ spine[i]_z \end{pmatrix}$$

Bug #5 - Missing Normalization of Zaxis in a case

Bug #3 - Incorrect Matrix Initialization

$$= \begin{pmatrix} Xaxis_x & Yaxis_x & Zaxis_x \\ Xaxis_y & Yaxis_y & Zaxis_y \\ Xaxis_z & Yaxis_z & Zaxis_z \end{pmatrix} \begin{pmatrix} \text{Correc} \\ -\text{tion} \\ \text{Rotat} \\ -\text{ion} \end{pmatrix} \begin{pmatrix} \text{orien} \\ -\text{tat} \\ -\text{ion} \end{pmatrix} \begin{pmatrix} S_x & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & S_y \end{pmatrix} \begin{pmatrix} vfCrossSection_x \\ 0 \\ vfCrossSection_y \end{pmatrix} + \begin{pmatrix} spine[i]_x \\ spine[i]_y \\ spine[i]_z \end{pmatrix}$$

Convert (SCP points) to Local Extrusion domain

Defined at SCP domain

Defined at Local Extrusion domain.

Old Xj3D Viewer :

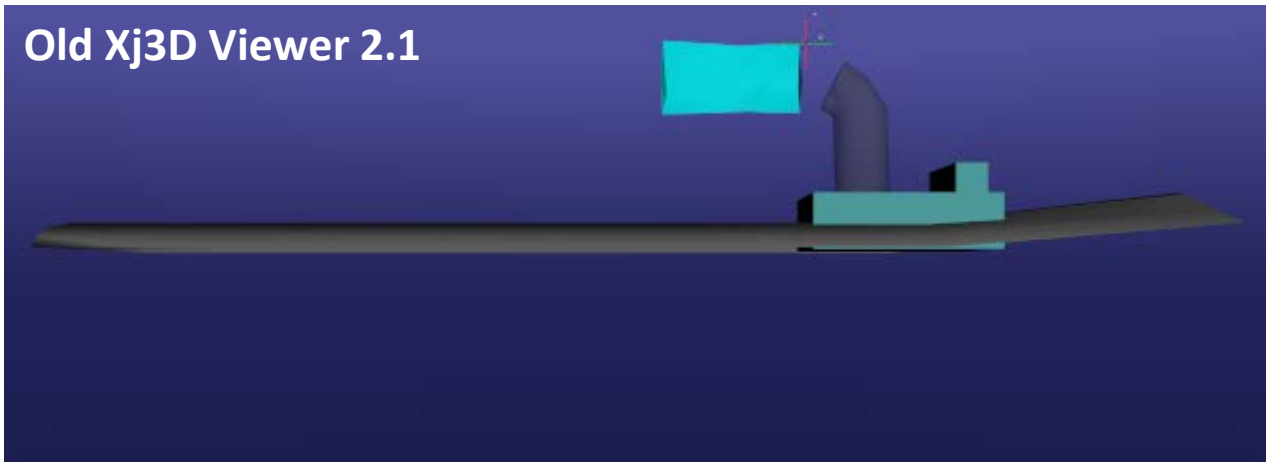
Bug #2 - Incorrect Matrix Ordering

Bug #4 - Not sure of this matrix

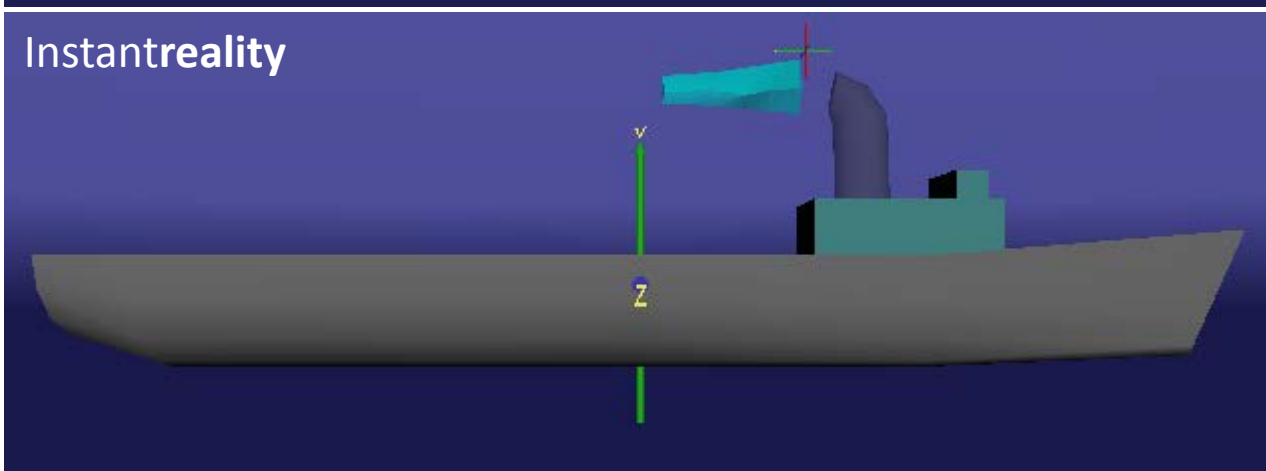
$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} S_x & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & S_y \end{pmatrix} \begin{pmatrix} Xaxis_x & Yaxis_x & Zaxis_x \\ Xaxis_y & Yaxis_y & Zaxis_y \\ Xaxis_z & Yaxis_z & Zaxis_z \end{pmatrix} \begin{pmatrix} \text{Correc} \\ -\text{tion} \\ \text{Rotat} \\ -\text{ion} \end{pmatrix} \begin{pmatrix} \text{orien} \\ -\text{tat} \\ -\text{ion} \end{pmatrix} \begin{pmatrix} vfCrossSection_x \\ 0 \\ vfCrossSection_y \end{pmatrix} + \begin{pmatrix} spine[i]_x \\ spine[i]_y \\ spine[i]_z \end{pmatrix}$$

# Result of BugFix #1~#3

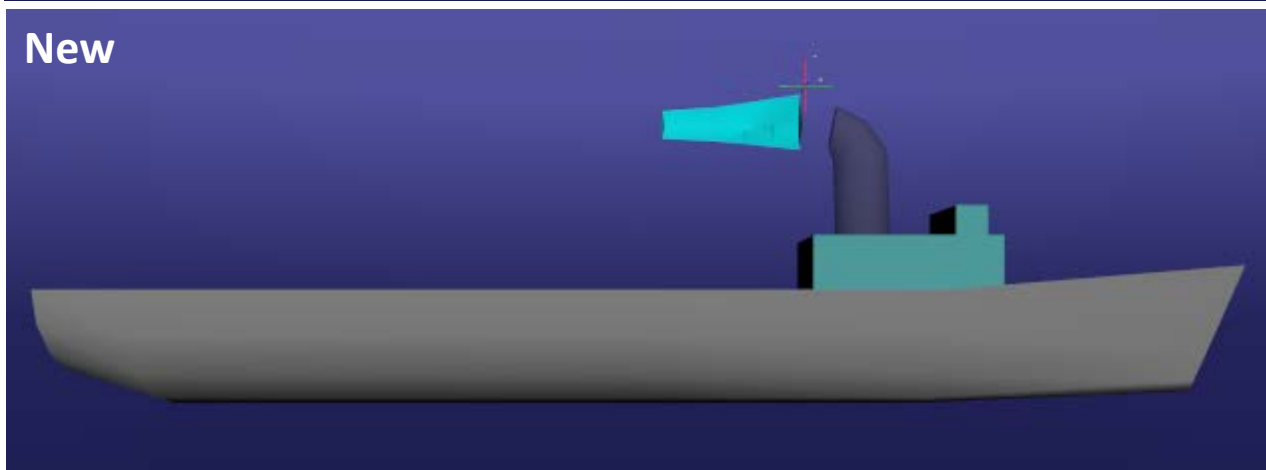
## Old Xj3D Viewer 2.1



## Instantreality

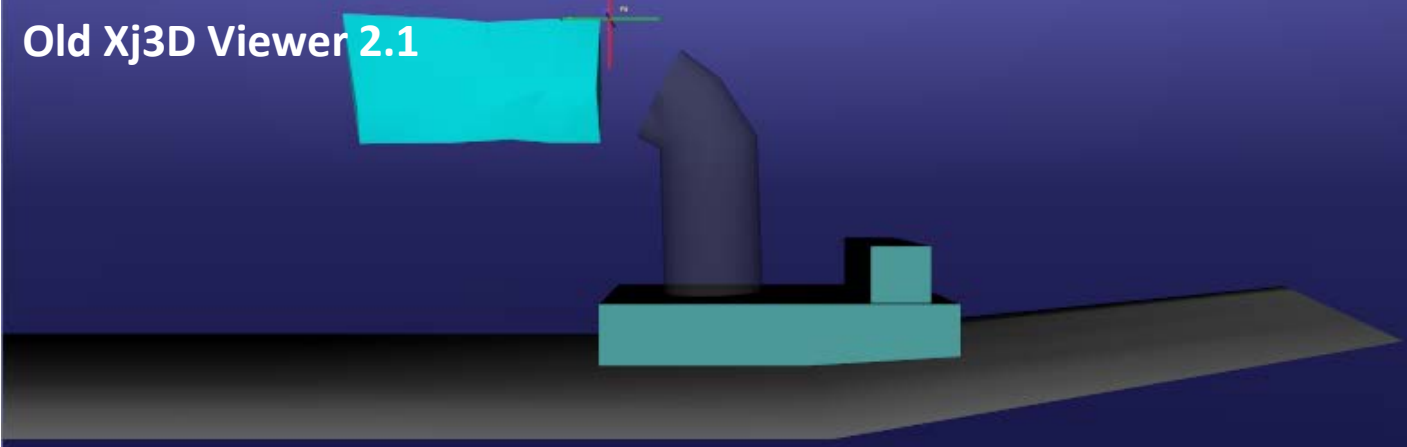


## New

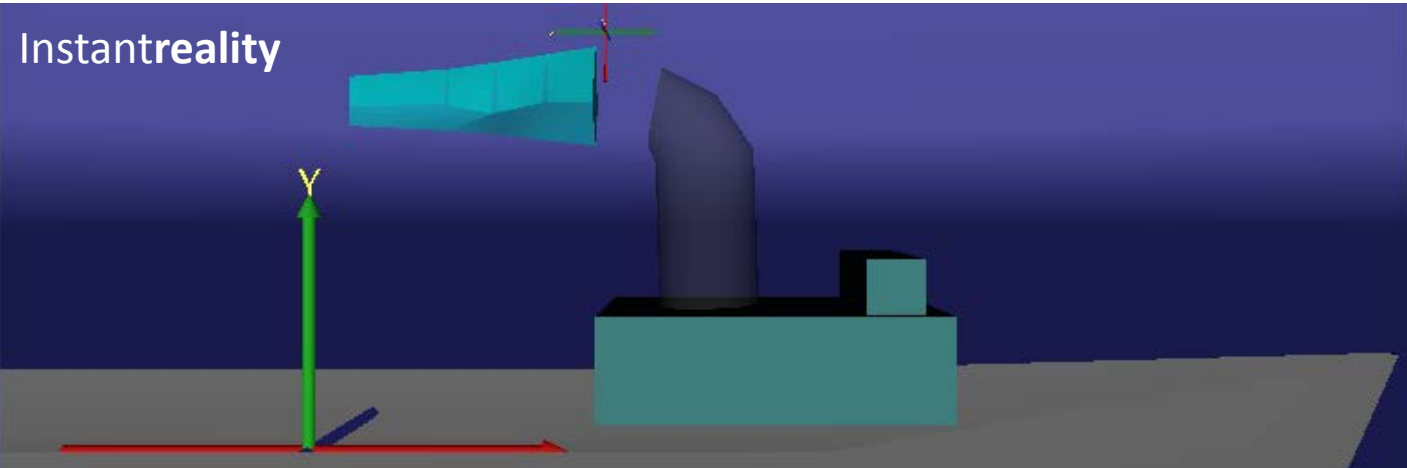


Result of BugFix #1~#3

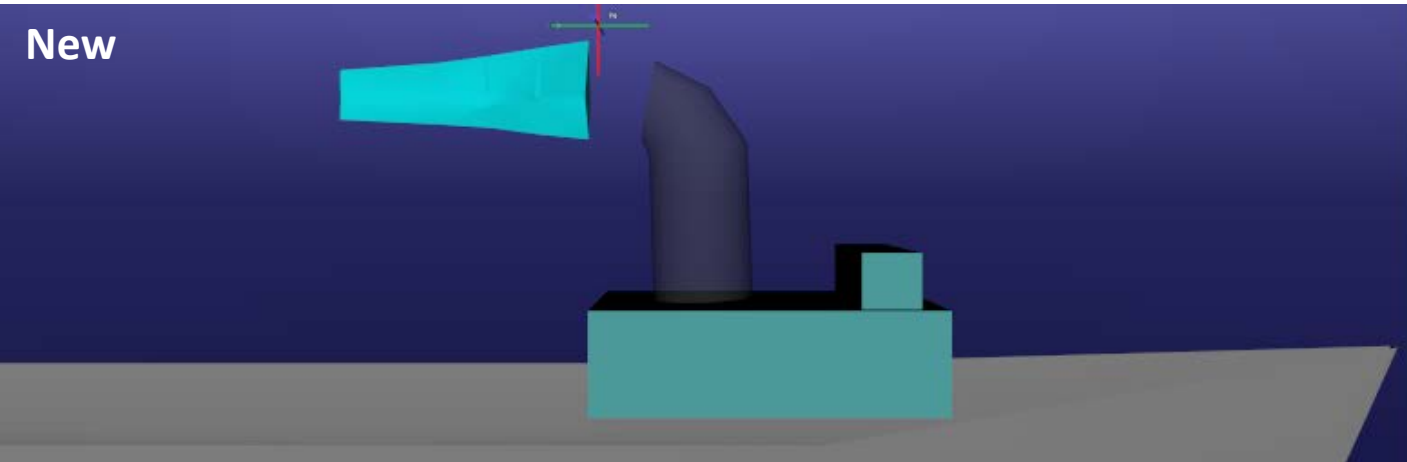
Old Xj3D Viewer 2.1



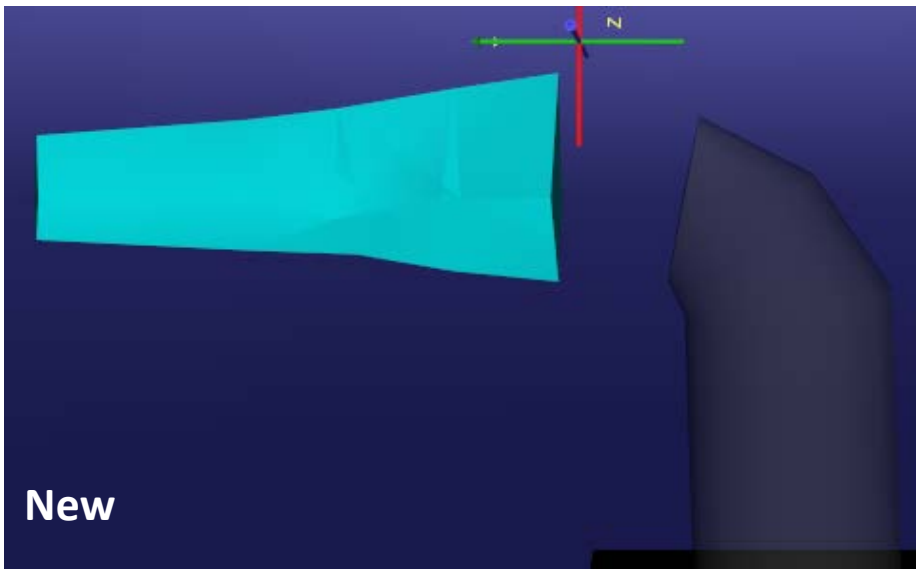
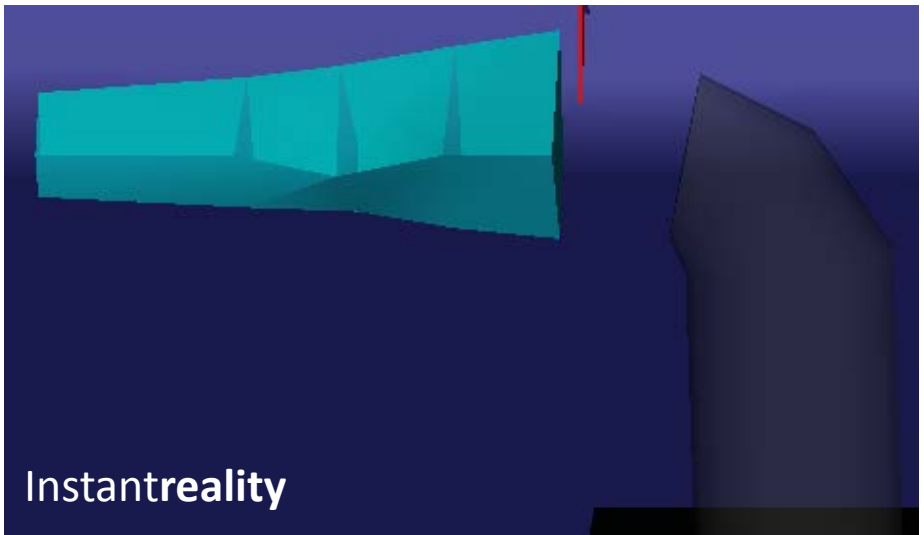
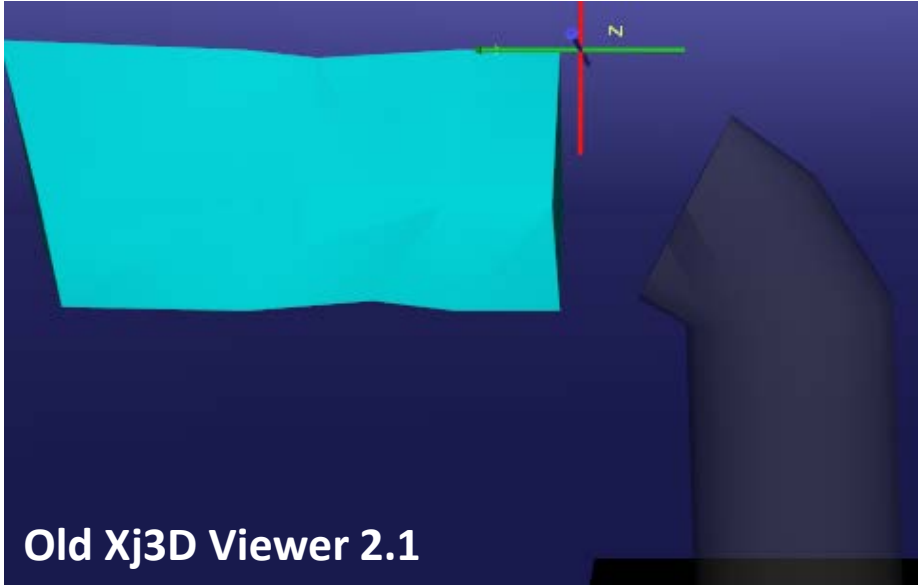
Instantreality



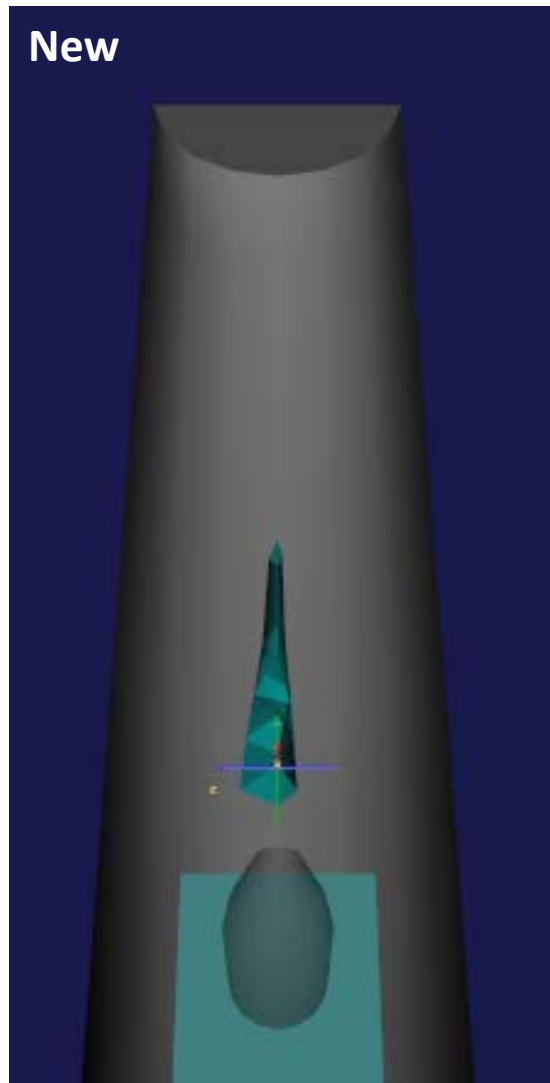
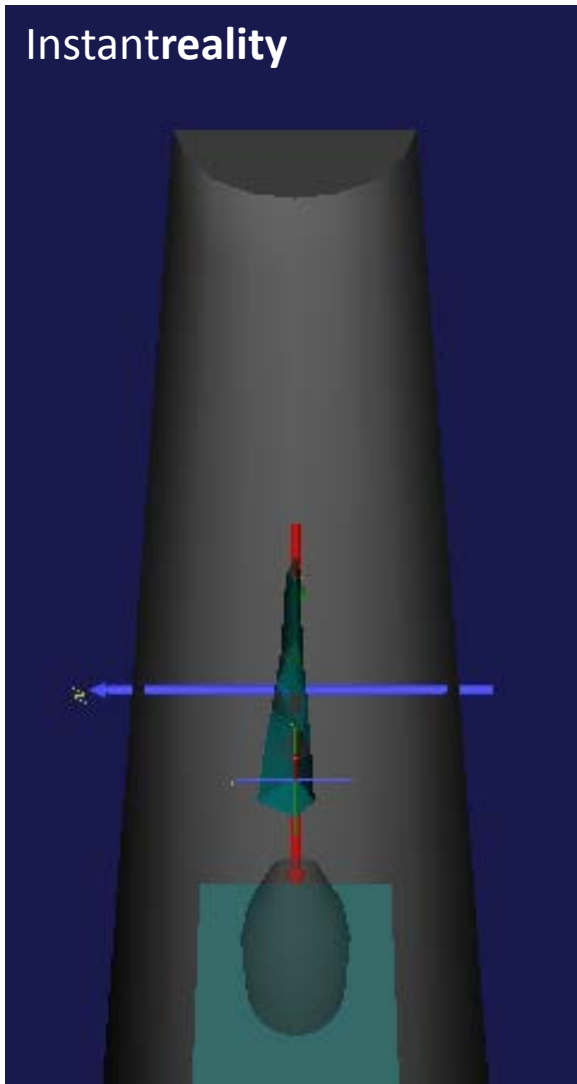
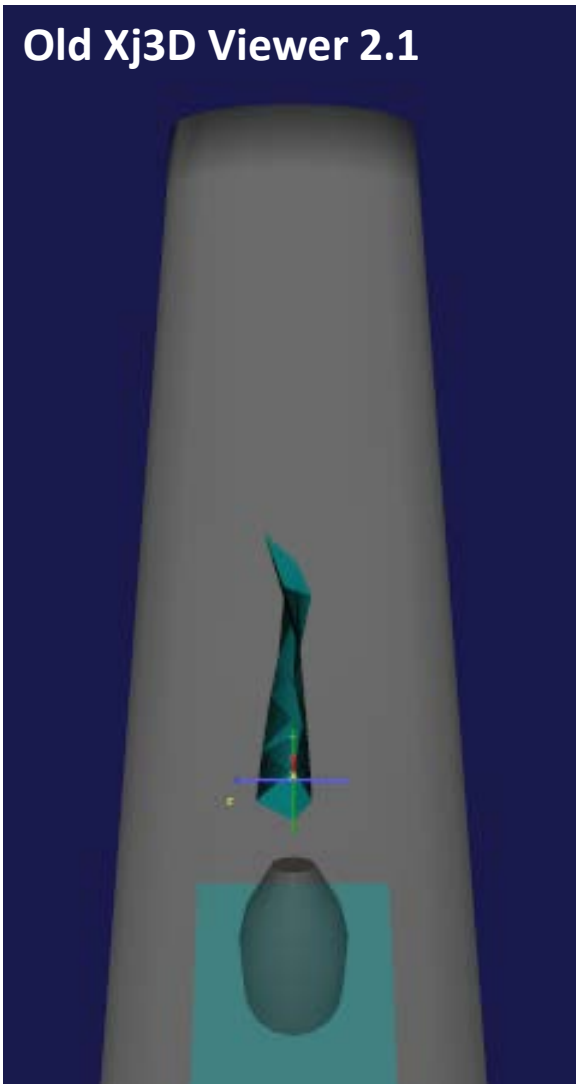
New



# Result of BugFix #1~#3



Result of BugFix #1~#3



BugFix #4 – Remove prior partial incomplete bugfix :

`createCorrectionRotations(z)`

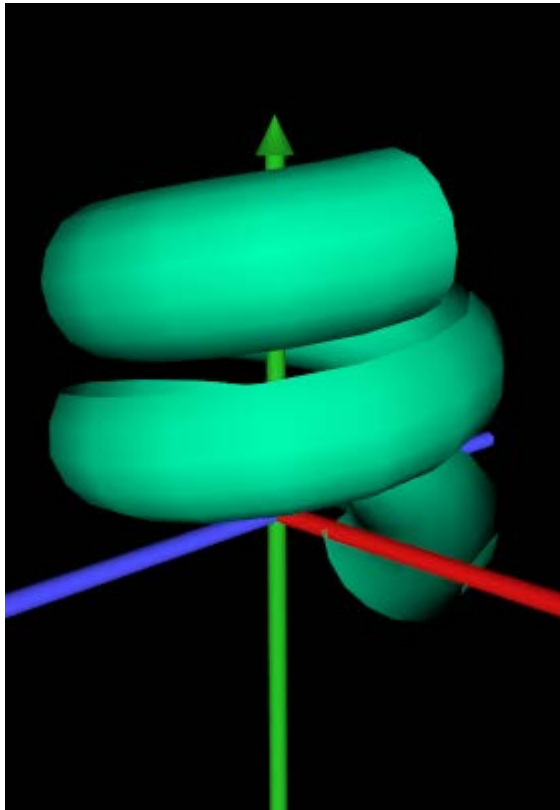
Method remains in place but is now ignored and deprecated.

# Result of BugFix #4

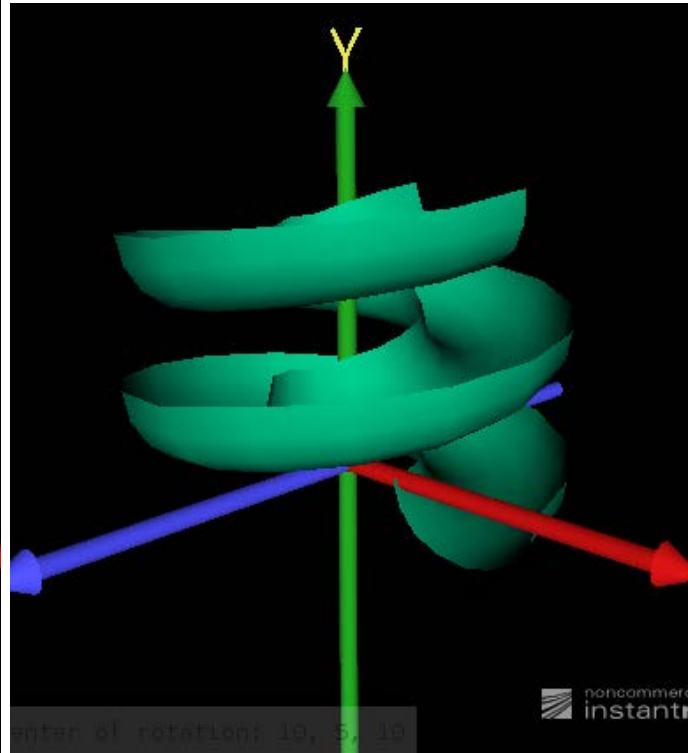
## Old Xj3D Viewer 2.1

With

`createCorrectionRotations(z)`



## Instantreality



## New one

Without prior bugfix

`createCorrectionRotations(z)`

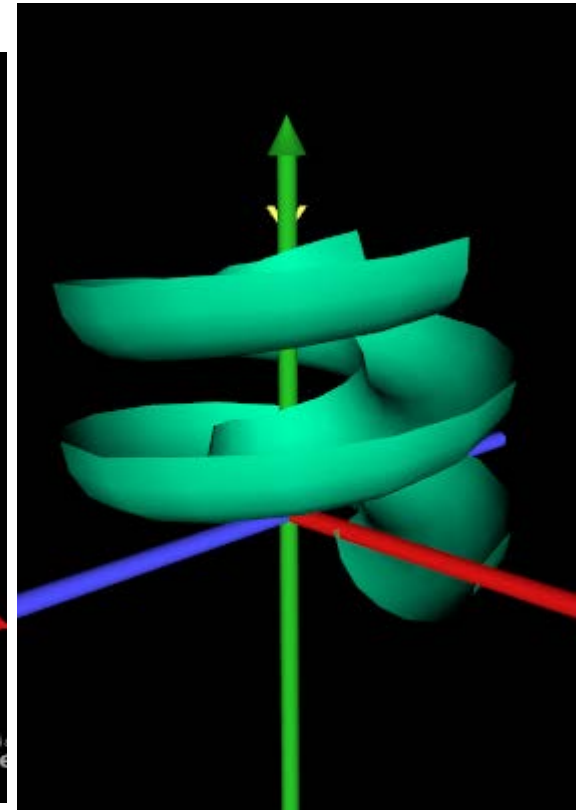


Figure15.11ExtrudedPlaygroundSlideWithAxes.x3d



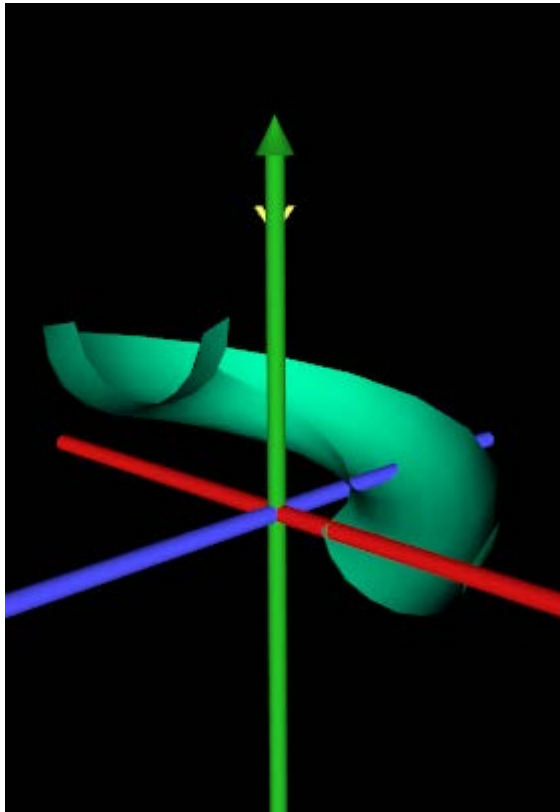
# Result of BugFix #4

## Old Xj3D Viewer 2.1

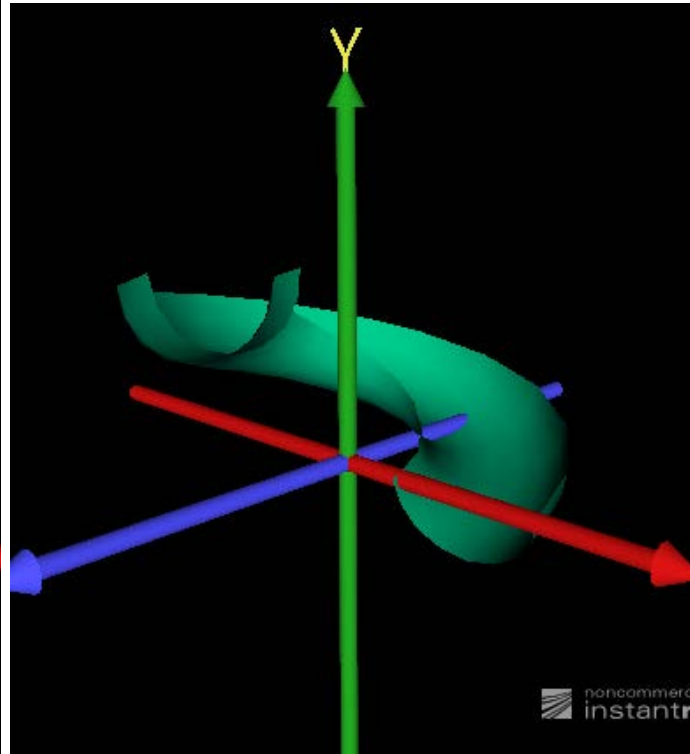
With

`createCorrectionRotations(z)`

But fixed only incorrect initialization



## Instantreality



## New one

Without prior bugfix

`createCorrectionRotations(z)`

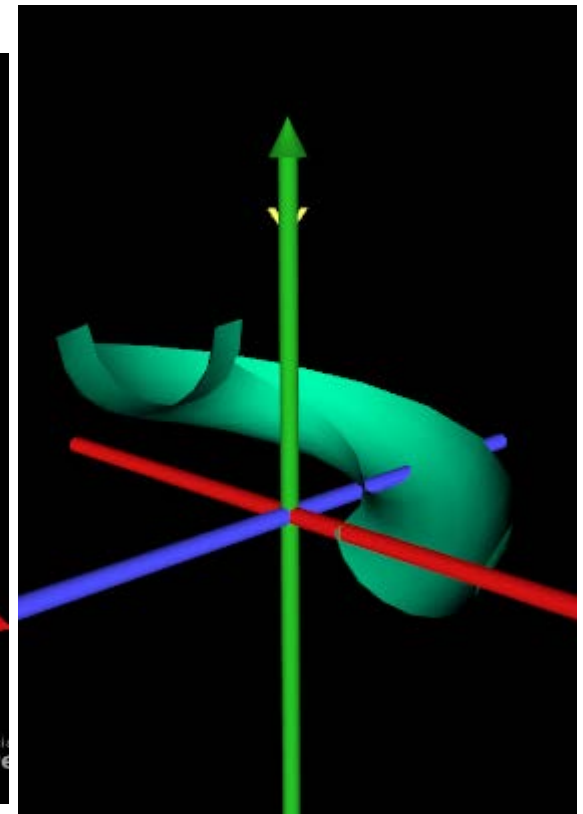


Figure15.11ExtrudedPlaygroundSlideSimpleWithAxes.x3d

Bug #5 – Add normalization of z axis  
in case of closed spine

Solution : `add norm(z[0]);`

`OGLExtrusion.java`  
`calculateSCP ()`

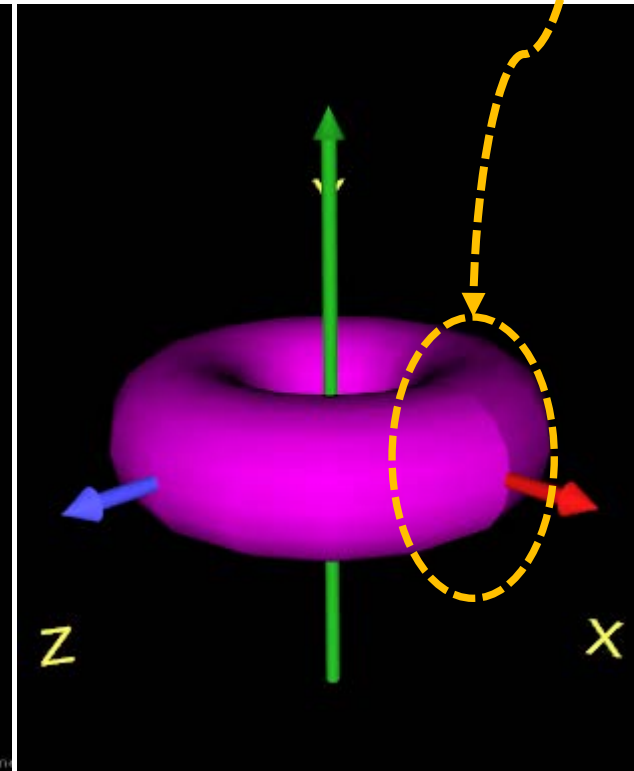
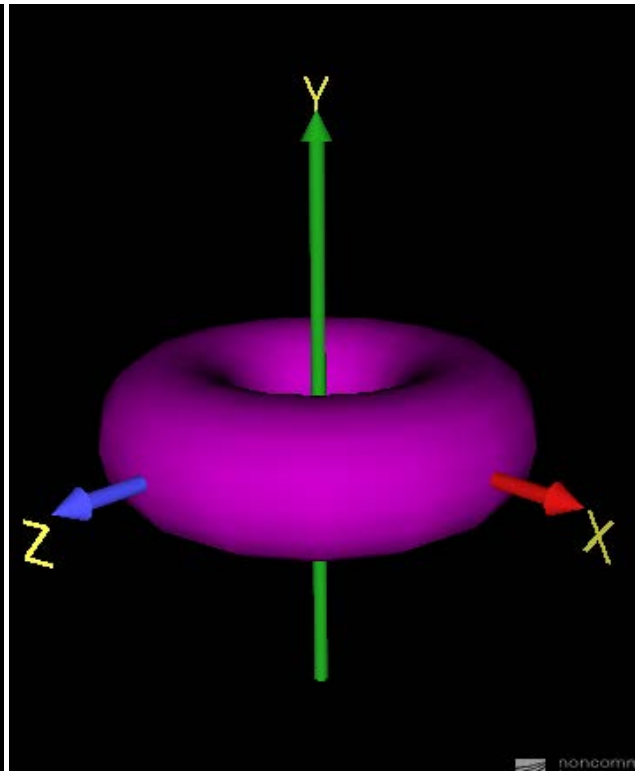
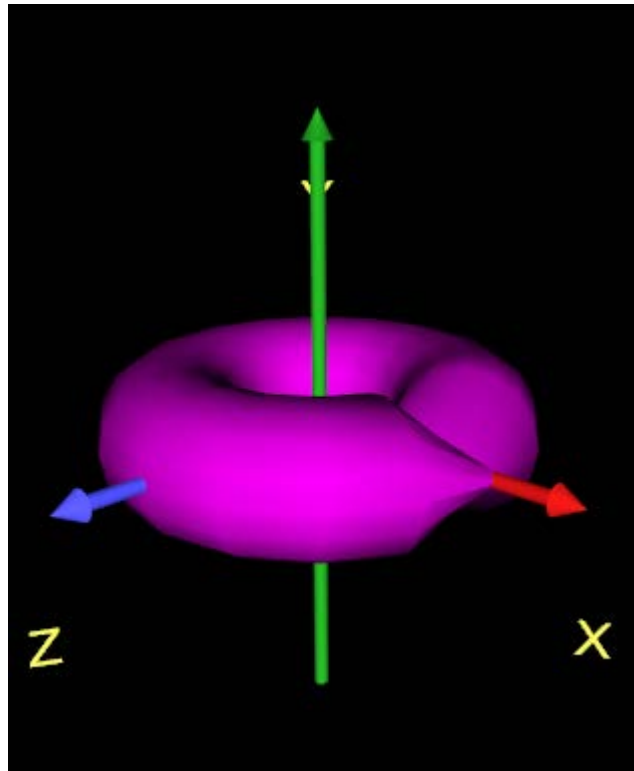
Result of BugFix #5

Bug #6 -  
Incorrect shading of seam

Old Xj3D Viewer 2.1

Instantreality

New one



Bug #6 – Combined normal for Closed Spine to avoid incorrect shading of seam

Solution :

Coordinate Index of last cross section

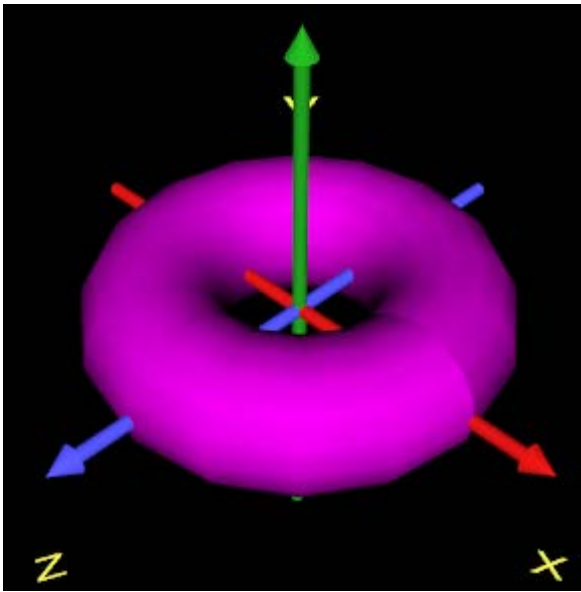
← Coordinate index of 1<sup>st</sup> cross section  
when computing combined normals

OGLExtrusion.java

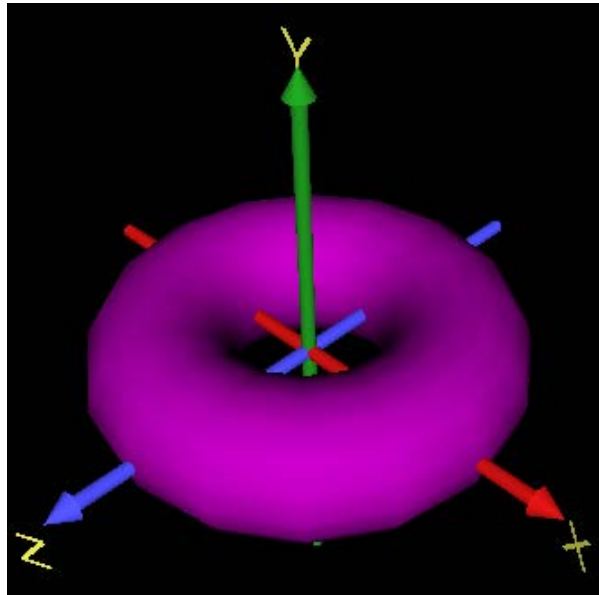
createIndicesTriangleArray ()

# Result of BugFix #6

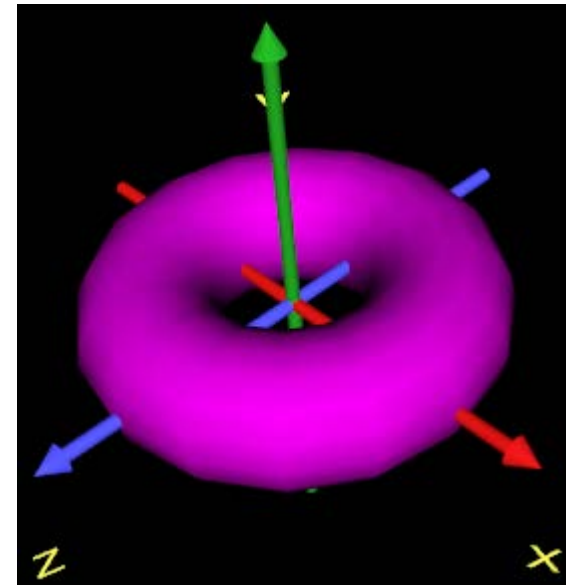
## Old Xj3D Viewer 2.1



## Instantreality



## New one



## Bug #7 – Shading 2

Solution : Split Wall Face / Cap Face  
from calculating normal  
vector average

GeometryUtils.java

buildConvexPolygons() :

buildConcavePolygons() :

create and set FaceType

generateNormals() : use FaceType

creaseAngle is improperly applied.

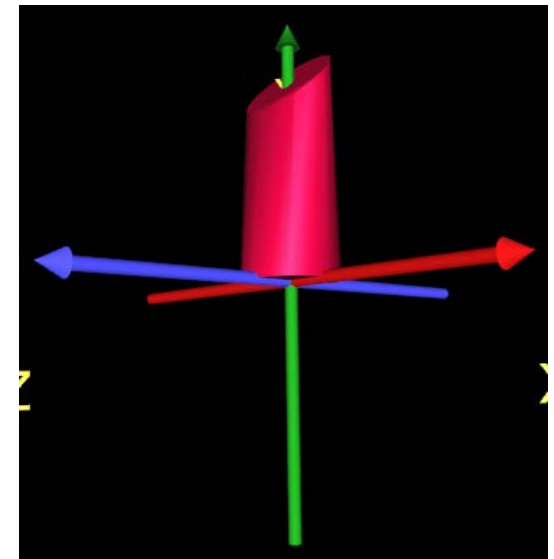
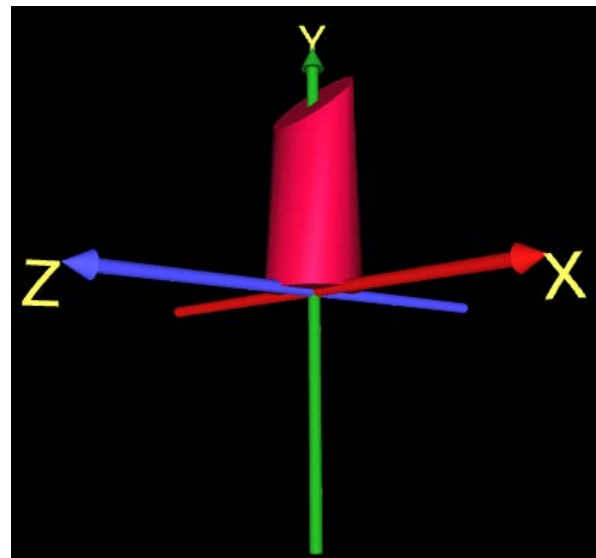
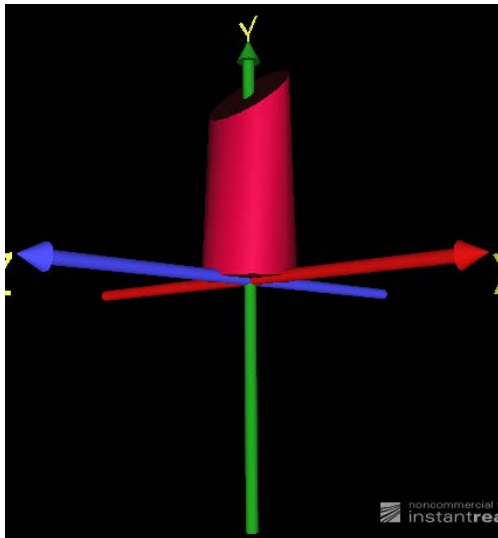
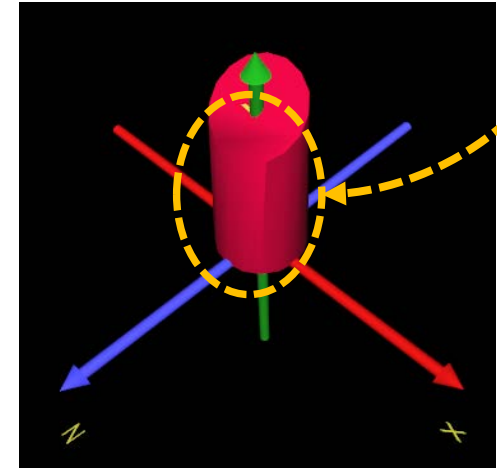
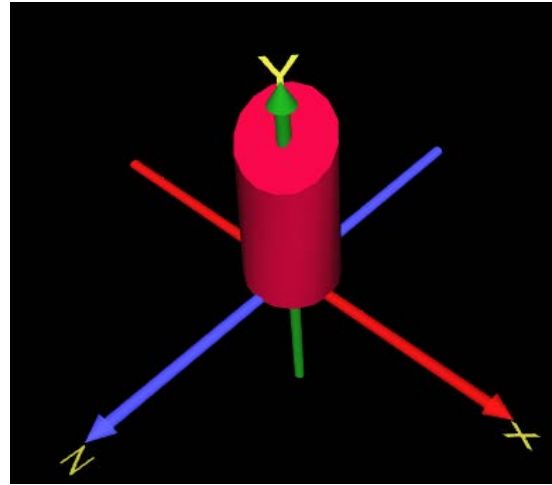
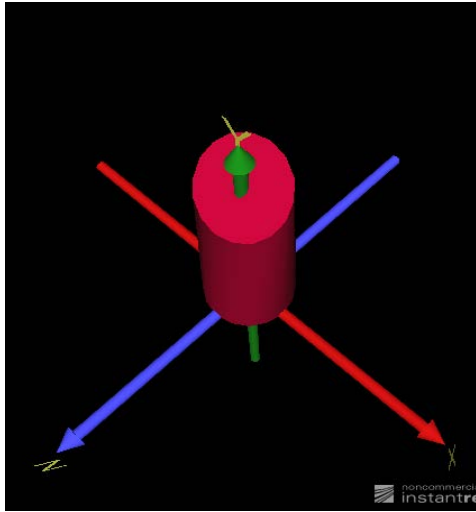
If creaseAngle = 0.9 (51.6 deg)

Bug #7 –  
Incorrect average of normals

Instantreality

X\_ITE

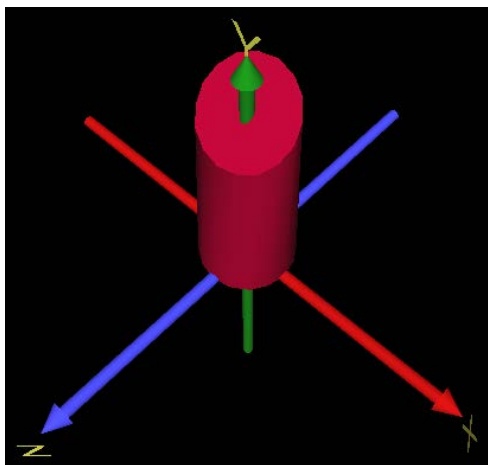
Old Xj3D Viewer 2.1



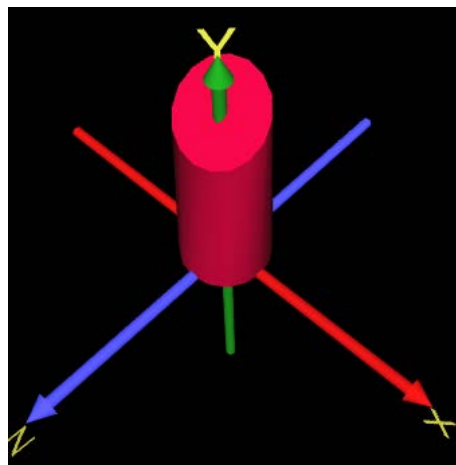
Exaggerating the issue

creaseAngle = 2.7 (154.7 deg)

Instantreality



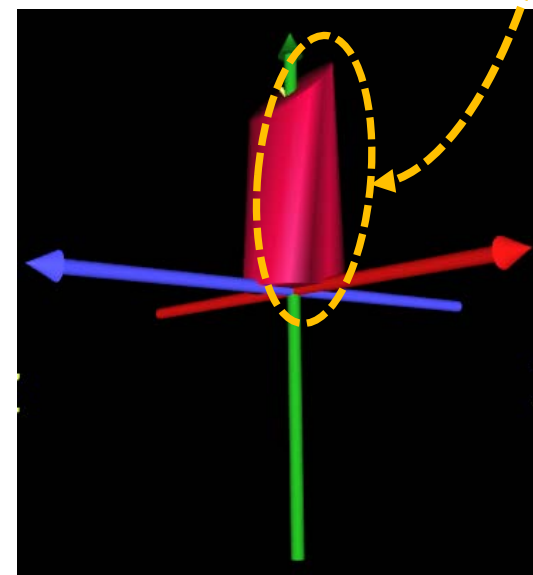
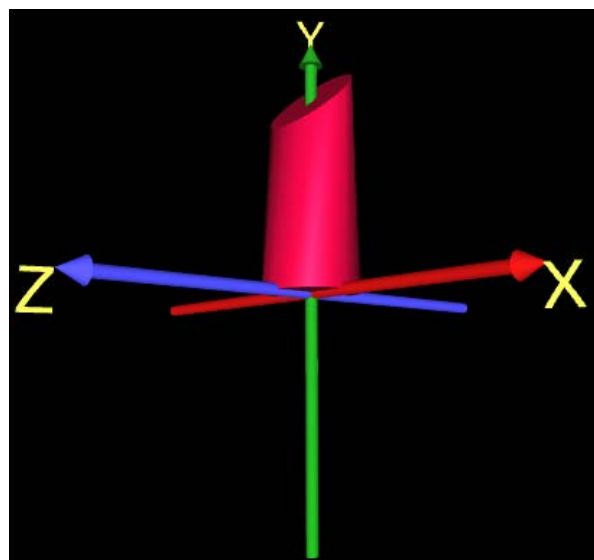
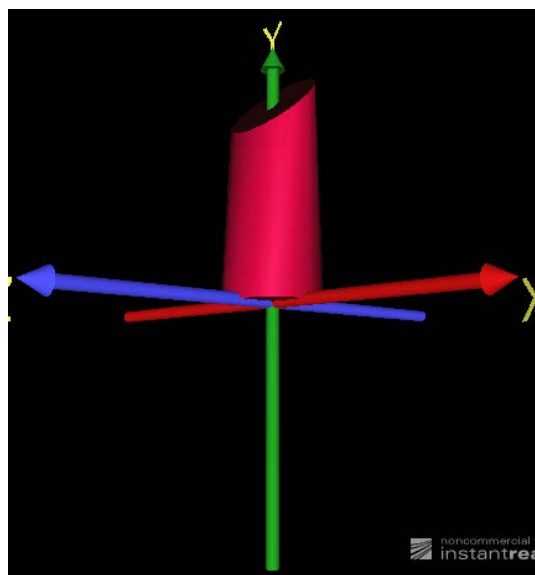
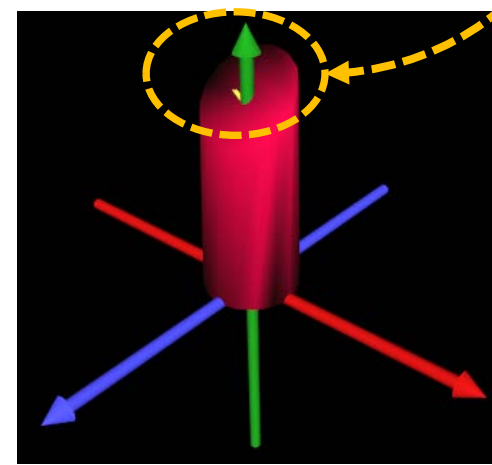
X\_ITE



Bug #7 -

Incorrect average of normals

Old Xj3D Viewer 2.1





Correction : Make end-cap edges always sharp rendered. TODO : Check specs.

**New Xj3D Viewer**

creaseAngle = 0.1 (5.7 deg)

**New Xj3D Viewer**

creaseAngle = 0.9 (154.7 deg)

**New Xj3D Viewer**

creaseAngle = 2.7 (154.7 deg)

