

TreeShape

A utility for designing simple tree shapes.

The upper part of the user dialog is used for editing individual shapes (e.g. a tree crown or a trunk). When edited these shapes can be added as tree components and silhouette views are displayed in the lower part of the user dialog. Finally the whole tree can be exported under the opf format.

The screenshot shows the 'Shape modeler' window. At the top, 'Cylinder' is selected as the shape. The 'graph options' section includes a 'Vertical profile' graph with 'height' on the y-axis (1.0 to 2.3) and 'radius' on the x-axis (-0.50 to 0.25). The graph shows a red dashed circle and a blue solid circle. Below the graph is a legend: $\text{---} X+$, $\text{---} Y+$, $\text{---} X-$, $\text{---} Y-$.

The 'Select editable columns' section has buttons for '1 profile', '2 profiles', and '4 profiles'. Below is a table with columns X-, Y-, Height, X+, and Y+.

X-	Y-	Height	X+	Y+
0	0	1	0	0
0,171	0,171	0,97	0,171	0,171
0,321	0,321	0,883	0,321	0,321
0,433	0,433	0,75	0,35	0,433
0,492	0,492	0,587	0,3	0,492
0,492	0,492	0,413	0,4	0,492
0,433	0,433	0,25	0,433	0,433
0,321	0,321	0,117	0,321	0,321
0,171	0,171	0,03	0,171	0,171
0	0	0	0	0

Buttons: insert, delete, append, close curves. A magnifying glass icon is also present.

Scaling and position controls: X scaling 1.0, Y scaling 0.9, Z scaling 1.0; X position 0.0, Y position 0.0, Z position 1.0. Number of azimuths: 12.

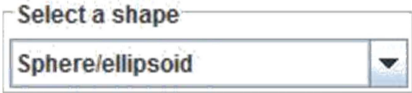
Buttons: add to tree, edit selection, undo, redo.

Component list: rename crown, Remove. The list contains 'crown' and 'trunk'. Below the list are three 3D tree models: a blue crown on a green trunk, a blue crown on a green trunk, and a blue crown on a green trunk.

Buttons: Quit, Get mesh, and a tree icon.

STEP BY STEP TUTORIAL

Top panel



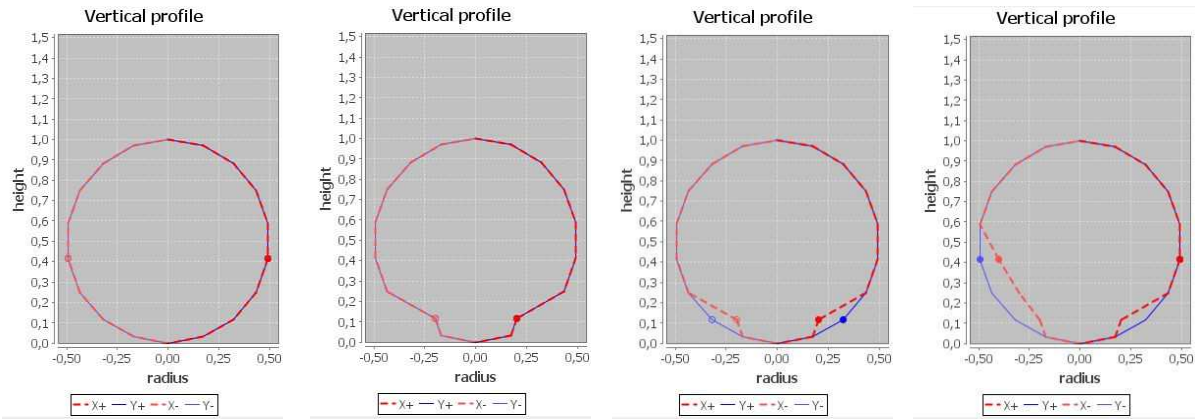
The combo at the top of the dialog box propose simple revolution shapes: sphere/ellipsoid, cone upward, cone downward or cylinder. When a shape is selected the 3D coordinates of the shape profile is displayed in the edition table and the shape vertical silhouette is displayed.



Because the original shapes are revolution shapes, only one vertical profile is needed for defining the shape. The coordinates of the vertical profile are displayed in the “height” and “X+” columns and can be edited (double-click in a cell, change the value and validate with the “enter” key).

The “2 profiles” button allows to edit different profiles in the XZ and YZ vertical planes. The silhouettes keep a bilateral symmetry in each plane.

The “4 profiles” button allows to edit disymmetrical silhouettes in the XZ and YZ planes.



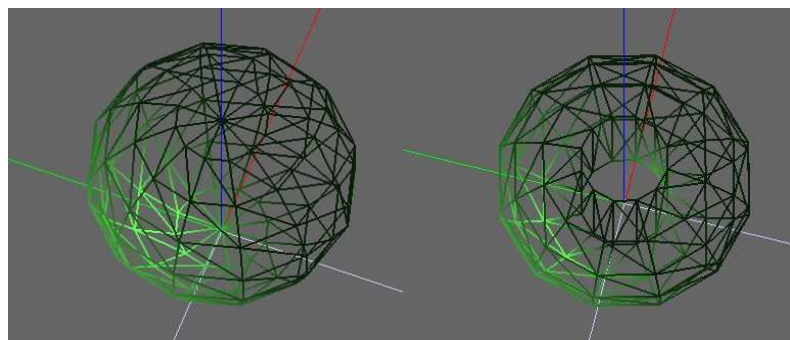
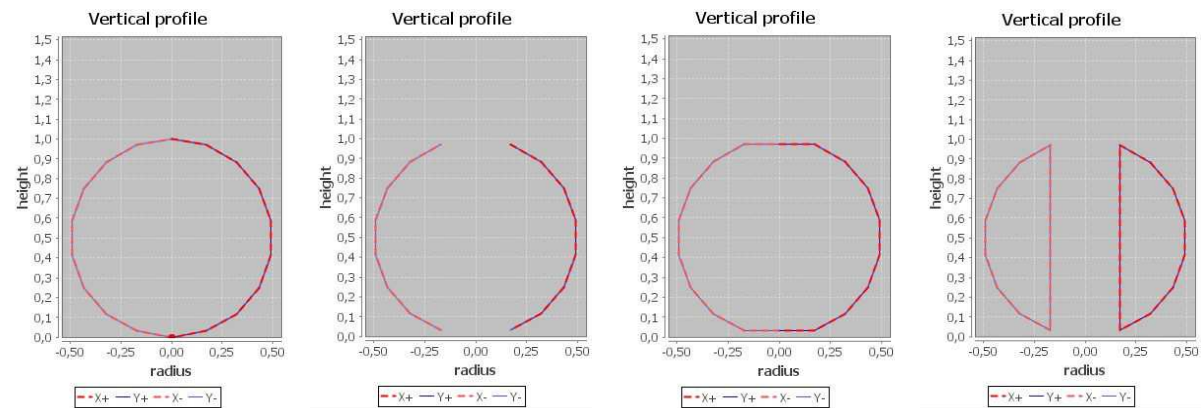
Shape edition modes: 1) Original revolution shape (ellipsoid). 2) Edition of a point in the “1 profile” mode: the shape remains a revolution shape. 3) Edition in the “2 profiles” mode: different profiles can be edited for the profiles in XZ and YZ vertical planes. 4) Edition in the “4 profiles” mode: profiles can be edited differently in 4 azimuths (X+, X-, Y+, Y-).



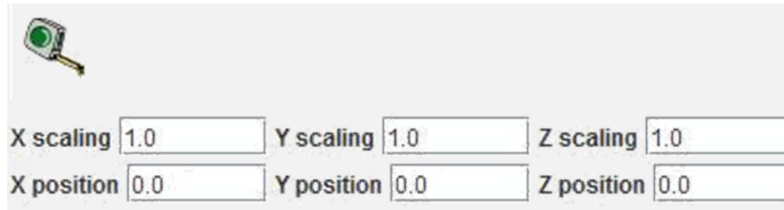
- The insert button adds a new line above the line selected in the edition table
- The append button adds a new line at the bottom of the edition table
- The delete button suppress the selected line



Open shapes can be edited. However if a “turbid medium” model is to be applied the shape must be a closed volume. Two options are proposed when selecting the “close” button: “close top and bottom” or “join first and last points”. When using the first option a point is added at the top and/or at the bottom of the shape. When using the second option the free ends of the profiles are connected together. This regularly generates volumes with holes.

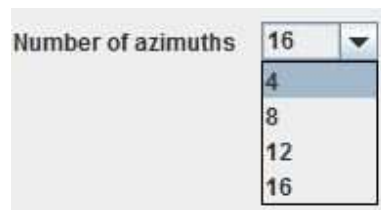


Close shape options: 1) original ellipsoid. 2) Ellipsoid after deletion of the top and the bottom. 3) Result obtained when applying the “close top and bottom” option. 4) Result obtained when applying the “join first and last points” option. 5) Corresponding 3D views of closed shapes

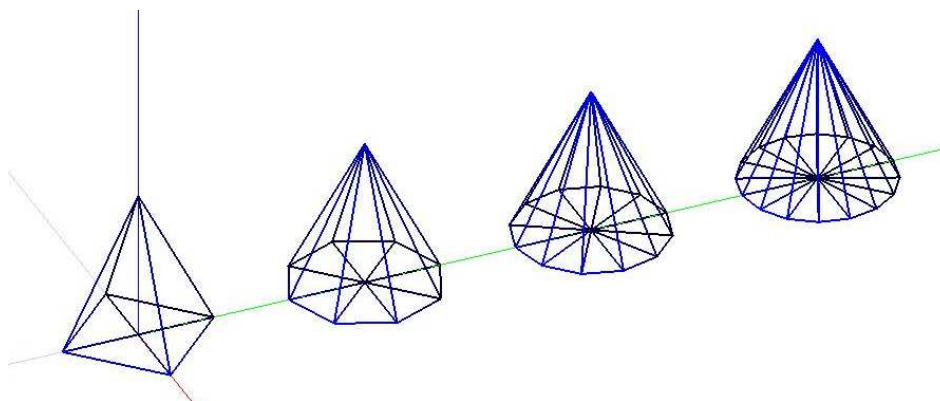


X, Y and Z scaling: Different scaling factors can be entered in order to stretch or shrink the shape in the X, Y or Z directions. Scaling can be used for example to transform a sphere into an ellipsoid. Note that the scaling factors modify the shape but do not modify the values in the edition table.

X, Y and Z positions: This can be used for translating the shape. Typically the edition of the Z position is used for positioning the crown at a given height.

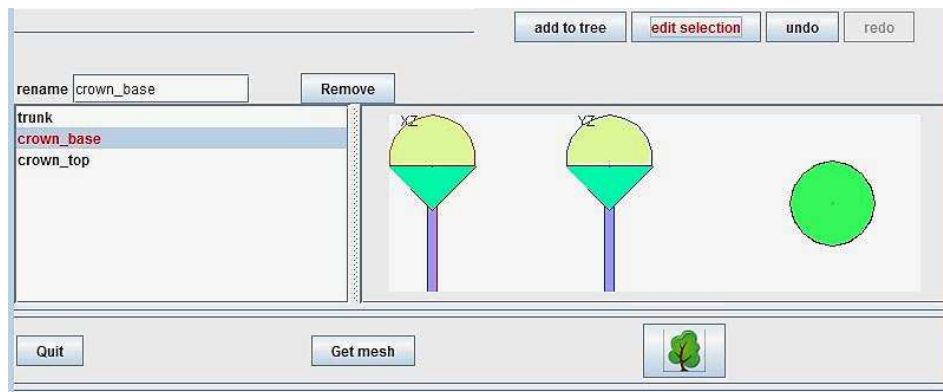


A given shape is represented by a mesh with a variable number of facets according to selected number of azimuths (4, 8, 12 or 16 azimuths).



Meshes generated for a cone when changing the number of azimuths from 4 to 16

Bottom panel



Example of a tree with 3 components and a 3D view (from XPl0) of the tree.

Add to tree

The “add to tree” button adds the current shape as a tree component. For instance a trunk and a crown can be successively added to create a tree. In the above example a trunk is created by selecting a cylinder shape and applying scaling factor of 0.1 in X and Y. Then the base of the crown is created by selecting a “downward cone” and translating it above the trunk. Last the top of the crown is created by selecting a sphere, cutting its downward hemisphere and translating it at the proper altitude.

rename crown_base

Tree components inherit their name from the original selected shape (“ellipsoid”, “cone_upward”, “cone_downward” or “cylinder”). However two components can’t have the same name and a new name is asked for when adding a new component if there is already a component with the same name. At any time a component can be renamed. In the above example, the crown base has been renamed from “ellipsoid” to “crown_base”, the crown top has been renamed from “ellipsoid” to “crown_top” and the trunk from “cylinder” to “trunk”.

edit selection

edit selection


Tree components can be modified at any time. Just select a component and activate the “edit selection” button (in the above example the “crown_base” component is in the edition mode and its name is displayed in red). When a component is the edition mode the data table is automatically updated in the upper panel and any modification of the data table is automatically applied to the component. Click again on the “edit selection” button to quit the edition mode.

A rectangular button with a light gray background and a thin black border. The text "Remove component" is centered in a dark gray font.

The selected tree component is removed from the list of components. This operation can't be cancelled.

A rectangular button with a light gray background and a thin black border. The text "undo" is centered in a dark gray font.A rectangular button with a light gray background and a thin black border. The text "redo" is centered in a dark gray font.

Allows going back and forth in the stack of edit operations. Note that undo and redo applies only on the shapes in the upper panel but not on tree components that remain unchanged.

A text input field with a light gray background and a thin black border. The text "newTree" is entered in a dark gray font. The label "Tree name:" is positioned to the left of the input field.A rectangular button with a light blue gradient background and a thin black border. The text "save opf" is centered in a dark blue font.

The tree name can be edited in the text field. By default the name of the opf file is the tree name with an "opf" extension. However a different file name can be entered in the file choose dialog. If so the tree name is modified accordingly.