

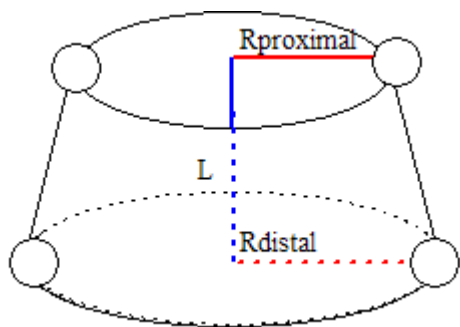
Segment Volume

Visual3D models segments as [cones](#), [cylinders](#), [spheres](#), and [ellipsoids](#). Visual3D doesn't compute the volume of a segment based on these geometries, but the calculations are straightforward in each case.

Volume Equations

Volume of a Conical Frustrum

One of the Visual3D segment geometries is labeled a [Cone](#) or, to be precise, a **conical frustrum**. A **frustra of right cones** is created by cutting the top off of a cone such that the cut is parallel to the base of the cone. Given a conical frustrum defined as below:

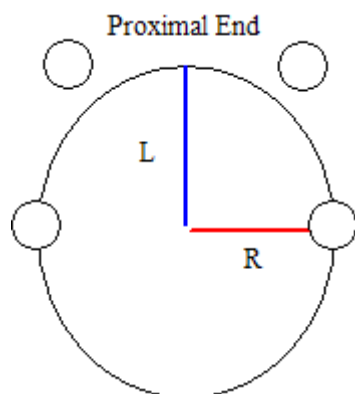


Its volume is calculated as:

$$Volume = \frac{\pi L (R_{distal}^2 + R_{distal}R_{proximal} + R_{proximal}^2)}{3}$$

Volume of an Ellipsoid

In Visual3D the inertial properties of an [ellipsoid](#) (sphere) are calculated using only the distal radius. For an ellipsoid defined as below, where L is the line between the segment's proximal end and its centre of mass,

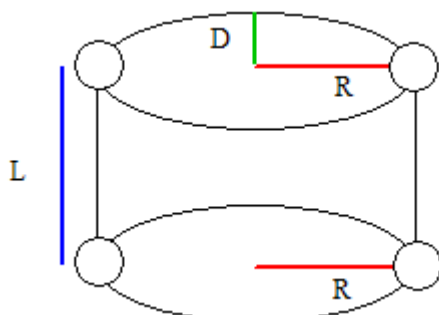


$$Volume = 4\pi LR_{distal}^2$$

Its volume is calculated as:

Volume of an Elliptical Cylinder

Finally, for an [elliptical cylinder](#) defined as:



Visual3D uses the radius at the distal end of the segment as the radius of the cylinder and calculates

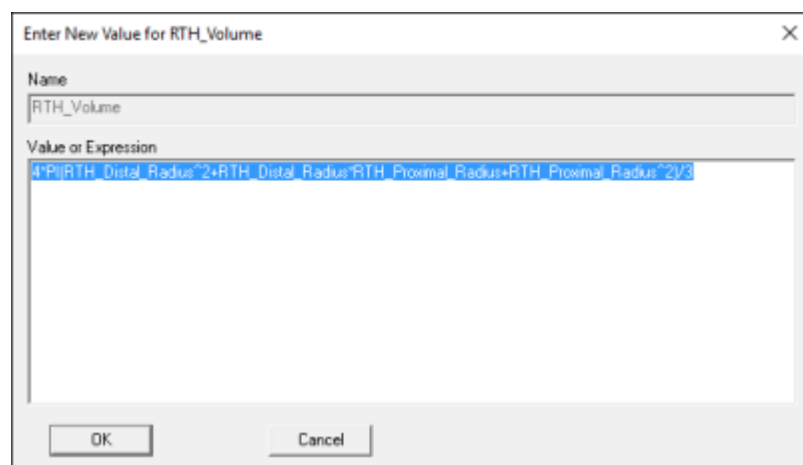
its volume as:

$$Volume = \frac{\pi}{4} LR_{distal} R_{proximal}$$

Specifying Segment Volume as a Model Metric

This segment volumes are not computed by default, but they can be added by the user as [Model Metrics](#).

This can be done through the interface, for example for a segment with **Cone** geometry:



Or through the [Set_Model_Metric](#) pipeline command, for example for a segment with **Elliptical Cylinder** geometry:

```
Set_Model_Metric
/METRIC_NAME=Pelvis_Volume
! /METRIC_VALUE=PI*RPV_Seg_Length*RPV_Distal_Radius*RPV_Proximal_Radius/4
```

;

See Also

Go back to the [Segment Overview](#) for more information about segments in Visual3D.

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