Summary of Aortic Root Analysis

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1 Inputs and choices

- Medial mesh
- units
- Reference frame
- Open and close frames

2 Outputs

2.1 Visualisation Toolkit polydata or vtp files

For each frame submitted, there is now a .vtp file which includes the new biomedical values that have been calculated. This data is best viewed in the free software, paraview.

The data now included are either specific to the points, to the cells, or are are uniform over the whole field. The point specific values are: The root labels -

- STJ - Marks the sinotubular junction with value 1 and 0 elsewhere.
- VAJ - Marks the ventriculo-aortic junction with value 1 and 0 elsewhere.
- IAS - Marks the interatrial septum with value 1 and 0 elsewhere.
- Label - ???

The root properties -

- Curv_Gaussian - The gaussian curvature, at each point.
- Curv_Mean - The mean curvature, at each point.
- J_Pt - The jacobian, at each point.
- I1_Pt - The principle strain, at each point.
- Motion - The motion of each point between the time frames.
- Total_Motion - The cumulative motion, at each point.
- Thickness - The wall thickness of the root, at each point.
- Radius - The distance from the wall centre to the wall edge, at each point.
- Circ_Strain_Pt - the Circumferential strain, at each point.
- Long_Strain_Pt - the Longitudinal strain, at each point.

Vectors -

- - Circumferential - The circumferential vector of the node.
- - Longitudinal - The logitudinal vector of the node.
- - Normal - The normal vector of the node.
- - Displacement_Wall - The displacement of the root wall, relative to the root centre, at each point.
- - Displacement_Root - The displacement of root, without the wall movement at each point.
- - Displacement_Total - The displacement of each point, with both the wall and root displacements.

The cell specific values:

- J - The jacobian, at each cell.
- I1 - The principle strain, at each cell.
- Circ_Strain - the Circumferential strain, at each cell.
- Long_Strain - the Longitudinal strain, at each cell.

The field values:

- WallArea - The total wall area of the frame.
- WallVolume - The total wall volume of the frame.
- LumenVolume - The total lumen volume of the frame.
- ValvePosition - A label specifiying if the valve is open (value of 1) or closed (value of 0).

Visualisation

When all the frames are loaded in paraview the frames can be cycled through. The movements of the root have been separated so that the wall movement, without the movement of the whole root, and the root movement, without the wall movement, can be viewed separately. The default has the movement fixed to the position of the reference frame. To view the movements, apply the 'Warp By Vector' filter and chose the relevant displacement vector (wall, root or total displacement).

The point vectors can be visualised with the filter 'Glyphs'.

2.2 CSV data files

Also included are two .csv files which contain average values and field values for each time frame. There is a raw data set, in which the time points are determined by the original frames submitted and the time between each. The second set has the the time standardised, so that different data sets can be more readily compared. It should be noted that, for the standardised time, it has been assumed that the cycle starts before when the valve opens and that the ratio of the valve being open to it being closed is 1:2

3 Figures

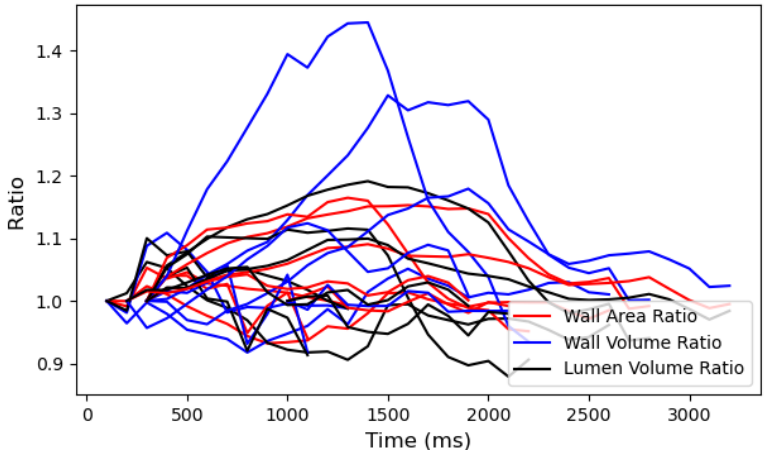

Figure 1: Wall area, wall volume and lumen volume ratio, with original time data.

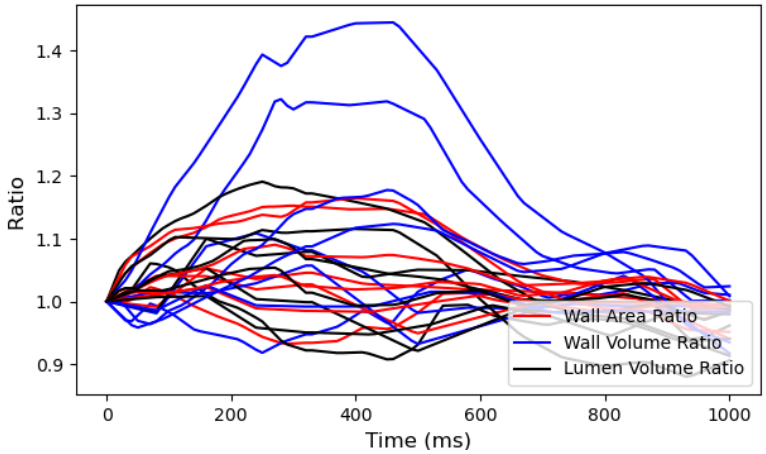

Figure 2: Wall area, wall volume and lumen volume ratio, with standardised time data.

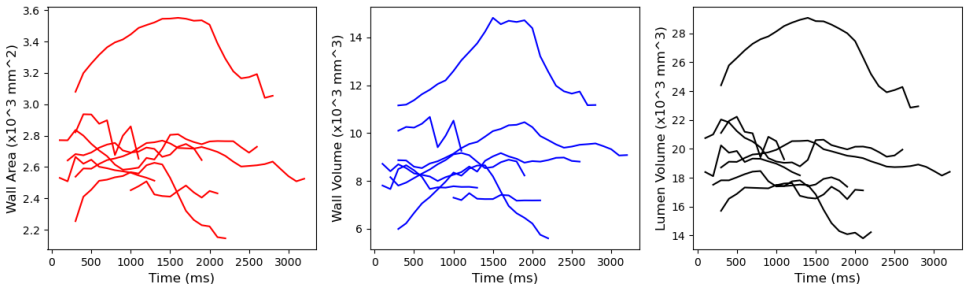

Figure 3: Raw data of wall area, wall volume and lumen volumes, with original time data.

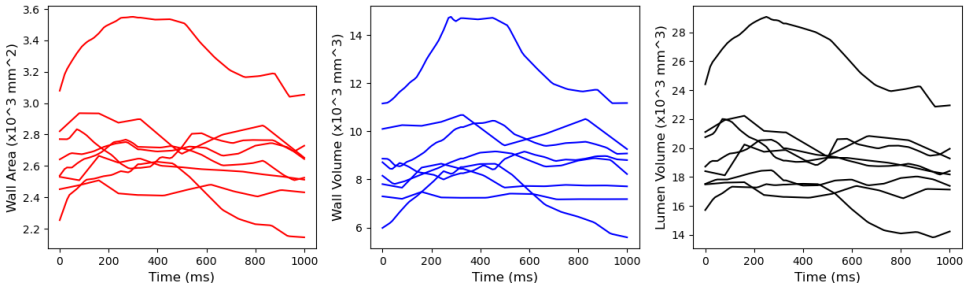

Figure 4: Raw data of wall area, wall volume and lumen volume ratio, with standardised time data.