Appendix S5. Element axis orientation

In order to obtain the circumferential and longitudinal stress of the aortic wall, the element axis was firstly oriented during mesh construction process. In LS-Prepost, the ‘direction’ function in ‘element editing’ submenu was used to orient the axis of the selected aortic shell elements along lumen longitudinal direction (Fig. E. 1). The aortic shell elements were subsequently offset with an uniform 2mm thickness to generate the brick elements, the axis of which would also be consistently oriented. During post-processing, the aortic wall stress could be displayed according to element coordinate system, where the XX (Fig. E. 2) component corresponded to the circumferential stress and YY component (Fig. E. 3) to the longitudinal stress.

Fig. E. 1 Element axis of 2D aortic shell elements
Fig. E. 2 Circumferential stress distribution on 3D aortic wall

Fig. E. 3 Longitudinal stress distribution on 3D aortic wall