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NUMERICAL SIMULATION OF THE MECHANICAL RESPONSE OF THE HUMAN CAROTID

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Abstract. This work presents the numerical simulation of the in-vivo mechanical behaviour of the human carotid artery. The main motivation is to describe the material response of this artery when it is subjected to pressure levels within the normal and hypertension physiological ranges. To this end, a geometric reconstruction for the computational mesh generation was firstly done based on clinical data obtained via angiography. The NURBS surfaces were strategically defined with the sake of allowing the use of a structured hexahedra finite element mesh in the artery bifurcation. The quality of the mesh was assessed through the quantification of some geometric indexes. In a second stage, the mechanical response of the artery wall was described by means of a non-linear hyperelastic constitutive law where the presence of initial stresses is considered. Finally, the obtained numerical results for normal and hypertension conditions are compared and discussed with available results reported in the literature.