INVESTMENTS IN EDUCATION DEVELOPMENT

FE analysis of aortoiliac bifurcation

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Many cardiovascular diseases occur at bifurcations and branchings of large arteries. Atherosclerosis and arteriosclerosis are two of them. The geometrical configuration of a bifurcation has a major influence on the intramural stress distribution within arterial wall and the stress concentration factor at both the apex and the sides of bifurcation. High value of the intramural stress is one of risk factors for disease development. This article deals with aortoiliac bifurcations. Its geometry was parameterized to create FEM models. The Influence of aortic diameter, wall thickness, bifurcation angle, non-planarity angle and apex radius on the Misses stresses was evaluated. Regression model predicting Misses stresses from geometry is presented.

Approximation solution of 0D pulsatile flow within a capillary

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This paper deals with weak solution of the momentum balance equations. Different shapes of velocity profile are taken into account for description of pulsatile flow. The flow is assumed incompressible within the rigid capillary tube with constant diameter. The results of approximated solution of flow are compared with exact solution for various Womersley numbers. The same analysis was performed for a different type of weight functions and weighted residual methods. The assumption of Hagen-Pouseuille velocity profile causes error of flow rate in tens of per cent in the range of Womersley numbers 1-12 while the error of flow rate computed from fourth order polynomial velocity profile is only a few percents. The analysis proved that the integration of the residual and weight over the cross-section of pipe provides results of flow rate closer to the exact solution then the integration over radius. The integration over the area set the importance on wall function and back flow rate near the wall. It was revealed that the Galerkin method is the appropriate method for formulation of the weak solution of the pulsatile flow then the least square method and expert estimation of weighted function.

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