Oral communication (Mathematics and Medicine)

Comparing different structural assumptions in atherosclerotic plaque modelling

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Abstract

Atherosclerosis is associated with several cardiovascular pathologies which together are responsible for a large number of deaths in Western countries. After a long inflamatory process, a plaque grows within the arterial intima resulting in the thickening and loss of elasticity of the arterial walls. A vulnerable plaque may break off and be transported by the bloodstream eventually blocking it at a narrower point of the vessel tree. Besides, a thrombus can be originated, triggering similar consequences. In this talk, we compare the effects across different atheromatous plaque material assumptions on hemodynamics and biomechanics within a partly patient-specific computational domain representing an atherosclerotic artery. A full-scale 3D FSI numerical model is implemented and different material hyperelastic assumptions are considered for comparison purposes. Computed hemodynamic parameters and structural stress are shown and analyzed.

References

[1] N. El Khatib, O. Kafi, D. Oliveira, A. Sequeira, J. Tiago: *A Numerical 3D fluid-structure interaction model for blood flow in a MRI-based atherosclerotic artery.* Mathematical Modelling of Natural Phenomena. bf 18, 26 (2023)