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Investigation of geometry effects on blood flow in flexible carotid artery bifurcation[1] SANG HOON LEE, Seoul National University, HYOUNG GWON CHOI, Seoul National University of Science and Technology, JUNG YUL YOO, Seoul National University — To investigate the effect of the flexible artery wall on the flow field, numerical simulations for the blood flow are carried out. For solving the equation of motion for the structure in fluid-structure interaction problems, it is necessary to calculate the fluid force on the surface of the structure explicitly. To avoid the complexity due to the necessity of additional mechanical constraints, we use the combined formulation which includes both the fluid and structural equations of motion into single coupled variational equation. The Navier-Stokes equations for fluid flow are solved using a P2P1 Galerkin finite element method and mesh movement is achieved using arbitrary Lagrangian-Eulerian formulation. The Newmark method is employed for solving the dynamic equilibrium equations for linear elastic solid mechanics. The pulsatile, three-dimensional, incompressible flows of Newtonian fluids constrained in the flexible wall are analyzed. The study shows that flexibility of carotid wall affects significantly the flow phenomena during the pulse cycle. It is found that the flow field is also strongly influenced by bifurcation angle.

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