عنوان مقاله:

Simulation of Non-Newtonian Blood Flow in Diverging Bifurcated Vessels

محل انتشار:

تعداد صفحات اصل مقاله: 13

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خلاصه مقاله:

Bifurcated vessels represent a typical vascular unit of the cardiovascular system. In this study, the blood flow in symmetric and asymmetric bifurcated vessels are simulated based on computational fluid dynamics method. The blood is modeled as non-Newtonian fluid, and the pulsatile flow velocity is applied on the inlet. The effects of the fluid model, bifurcation angle and symmetry of the geometry of the vessel are investigated. The results show that the wall shear stress (WSS) on the outer wall of daughter branches for the non-Newtonian fluid flow is greater than that for Newtonian fluid flow, and the discrepancy between the flow of two fluid models is obvious at relatively low flow rates. With the bifurcation angle increases, the peak axial velocity of the cross-section of daughter branch decreases, so the WSS increases. For the non-Newtonian fluid flow in the asymmetric bifurcated vessels, more flow passes through the daughter vessel with a lower angle, and the WSS along the outer wall of which is lower. Furthermore, the region with a low time-averaged wall stress (TAWSS) and high oscillating shear index(OSI) distributed on the outer wall of bifurcation vessels are larger for the flow in the vessel with smaller bifurcation angle. In conclusion, the effects of the blood viscosity cannot be neglected at low flow rates and the geometry of the bifurcated vessel plays a key role with regards to the blood flow.

کلمات کلیدی:

Blood flow, non-Newtonian, Bifurcated vessel, wall shear stress, CFD

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