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Computational Simulation of Non-Newtonian Blood Flow in Carotid Bifurcation for Investigating the Various Rheological Blood Models

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ABSTRACT

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One of the leading causes for death after heart diseases and cancer in all over the world is still stroke. Most strokes happen because an artery carrying blood from the heart to the brain is clogged. Most of the time, as with heart attacks, the problem is atherosclerosis, hardening of the arteries, calcified build up of fatty deposits on the vessel wall. The primary troublemaker is the carotid artery, one on each side of the neck, the main thoroughfare for blood to the brain. In this study, the fluid dynamic simulations were done in the carotid bifurcation artery for studying the formation of atherosclerosis, and shear thinning behavior of blood as well as Newtonian comportment was studied. Under the steady flow conditions, Reynolds numbers representing the steady flow were under 1700. A comparison between rheological models for investigation each non-Newtonian model was carried out, velocity and wall shear stress distributions and its effect on developing atherosclerosis was studied; also the effect of non-Newtonian entrance length through this problem was exhibited.

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