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Numerical Investigation of Heat Transfer and Flow Characteristics of non-Newtonian Blood Flow in Atherosclerosis Coronary Artery: the Effect of Magnetic Field SIAVASH GHAFFARI, University of Tehran, SHIMA ALIZADEH, Stanford University, MOHAMMAD SADEQ KARIMI, University of Tehran — Temperature heterogeneity in plaque containing inflammatory cells can cause thermal stress, and accelerates rupture process. Activated inflammatory cells embedded in plaques release heat while the plaque is cooled by blood flow. In the present work, arterial wall temperature distribution of atherosclerotic Right Coronary in the presence of external uniform and multi-directional magnetic field is investigated by numerical methods. The rheology of the flowing blood is modeled by a generalized Power law model. An advanced coupled FEM-FVM algorithm is used to determine temperature distribution inside the artery. Transient Navier-Stokes and energy equations in 2D idealized arterial model of a bending artery coupled with Maxwell's equations are discretized using the Finite-Volume Method and solved by SIMPLE algorithm in curvilinear coordinate to analyze pulsatile blood flow, whereas the transient heat conduction equation in the plaque is solved simultaneously with these equations using Finite-Element Method. The plaque temperature, Nusselt Number and heat flux at the plaque/lumen interface is obtained for different states of magnetic field and different Power law indices (n) to investigate influence of produced electromagnetic force and blood viscosity on the cooling effect of blood. It is observed that how magnetic field and blood dilution modifies the temperature heterogeneity of plaque and decreases probability of rupture of Atherosclerotic plaque.

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