Computetional Analysis of flow and mass in stented artery during normal and increasing pulse

The current work is consisted of eight chapters in total. In the first introductory chapter the concept of vascular dynamics is explained, the concept of atherosis and the concept of stent. Moreover the importance of hydraulic engineering in problem solving is presented. Reference is made to previews works with main subject the mass transport (Low Density Lipoprotein, LDL) in stented vascular environment. Additionally the normal pulse and the pulse during exercise are described. Finally the importance of the current work is described. In chapter 2 the theories, based on which the LDL distribution is calculated, are analyzed and the advantages and disadvantages of using stents. Moreover it is made reference to previews works with main subjects the LDL transport in stented vascular environment. In chapter 3 the numerical methods of fluid dynamic are presented in brief. In chapter 4 the computational procedure that was followed in order for the results to be derived is given. More specifically, the way of extracting the geometry, the computational grids, the flow equations and the assumptions used by computational fluid dynamics are given. Moreover the cardiac pulse is described, the initial and boundary conditions and the LDL transport in the endothelium. Finally the User Defined Functions (UDFs) that were used are given. In chapter 5 the results of the problem with transient flow during normal pulse are given. The distribution of the Average shear wall stress and the Average shear wall stress vector is presented. Moreover the distribution of the relative residence time and the LDL concentration are given. In chapter 6 the results after the problem solving for transient flow during exercise are given. The distribution of average wall shear stress as well as the distribution of average wall shear stress vector is presented, as they were for the case of normal pulse. Moreover the distribution of the relative residence time and the LDL concentration of the vascular wall are given. In chapter 7 the comparison and analysis of the results in both cases of blood flow (normal and during exercise) is taking place. Specifically the distributions of average wall shear stress and average wall shear stress vector are analyzed. Additionally the distributions of relative residence time and LDL concentration on the vascular wall are analyzed. Finally in chapter 8 the conclusions that occurred from the above analysis are given.