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Numerical Simulation of the Flow in Vascular Grafts for Surgical Applications[1] PATRICK MCGAH, ALBERTO ALISEDA, University of Washington - Dept. of Mechanical Engineering — Numerical simulation of the human blood vessels, is becoming an important tool in surgical planning and research. Accurate vascular simulations might grant physicians the predictive capability to perform pre-surgical planning. We focus our attention on the implantation of vascular grafts. The high rate of failure of this common vascular interaction is intimately related to the fluid mechanics in the affected region and the subsequent wall tissue remodeling. Here, we will present our current work in developing a methodology for the numerical simulation of vascular grafts which incorporates physiologically realistic geometries and flow boundary conditions. In particular, we seek to correlate the wall shear stress and its spatial (WSSG) and temporal (OSI) variability to wall remodeling as observed in patient specific longitudinal studies. The pulsatility ($Re_{mean} = 800$, $Re_{peak} = 2000$, $Wo = 2$) of the flow gives rise to additional fluid dynamics phenomena such as instability, flow separation, transition, and unsteadiness. Our goal is to describe and evaluate their effect on the wall physiology.

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