Overview

This project aims to investigate the flow behaviour of blood past stenosed arteries. Using realistic blood flow rates, the flow behaviour can be analysed to provide pressure, velocity and stress distributions which can in turn lead to an understanding of critical areas within the artery. The other aim of this project is to implement fluid-structural interaction (FSI) into the simulation so that the wall stress and strain distributions can be analysed to determine the areas of critical stress and thus provide a good understanding of where plaque rupture is most likely to occur. This in turn allows medical practitioners to develop methods to address these issues.

Experimental Rig

The computational model is based on a geometry used in available literature, as shown in Figure 1. The model was generated and analysed using the commercially available ANSYS 8.1 – Multiphysics, which is capable of performing FSI, creating the velocity and pressure contours seen in Figures 2-4. After performing the fluid analysis, the boundary conditions may be coupled directly or indirectly to perform solid analysis and thus produce numerical results for comparison. The usage of FSI is expected to provide an analysis which approaches real cases far more accurately than assuming a rigid wall. With the available results, critical stress and recirculation areas may be identified.