World Academy of Science, Engineering and Technology
International Journal of Aerospace and Mechanical Engineering
Vol:16, No:07, 2022

# A Study of a Plaque Inhibition Through Stenosed Bifurcation Artery considering a Biomagnetic Blood Flow and Elastic Walls

**Authors :** M. A. Anwar, K. Iqbal, M. Razzaq

**Abstract :** Background and Objectives: This numerical study reflects the magnetic field's effect on the reduction of plaque formation due to stenosis in a stenosed bifurcated artery. The entire arterythe wall is assumed as linearly elastic, and blood flow is modeled as a Newtonian, viscous, steady, incompressible, laminar, biomagnetic fluid. Methods: An Arbitrary Lagrangian-Eulerian (ALE) technique is employed to formulate the hemodynamic flow in a bifurcated artery under the effect of the asymmetric magnetic field by two-way Fluid-structure interaction coupling. A stable P2P1 finite element pair is used to discretize thenonlinear system of partial differential equations. The resulting nonlinear system of algebraic equations is solved by the Newton Raphson method. Results: The numerical results for displacement, velocity magnitude, pressure, and wall shear stresses for Reynolds numbers, Re = 500, 1000, 1500, 2000, in the presence of magnetic fields are presented graphically. Conclusions: The numerical results show that the presence of the magnetic field influences the displacement and flows velocity magnitude considerably. The magnetic field reduces the flow separation, recirculation area adjacent to stenosis and gives rise to wall shear stress.

**Keywords :** bifurcation, elastic walls, finite element, wall shear stress,
**Conference Title :** ICFSI 2022 : International Conference on Fluid-Structure Interactions
**Conference Location :** Berlin, Germany
**Conference Dates :** July 21-22, 2022