# Abstract

This simulation was performed to analyze arterial blood flow using Navier Stokes equations and Lattice Boltzmann method with Bhatnagar Gross Krook approach. The pressure of arterial blood flow is affected by the plaque. In this case, plaque is a solid substance that settles on the walls of the arteries. One successful method in fluid motion is the Lattice Boltzmann method. This method is built using microscopic models and kinetic mesoscopic equations making it easy to use for any type of fluid including the blood flow which is the incompressible Navier Stokes fluid. The mathematical model of blood flow is obtained by deriving the Lattice Boltzmann equations with Bhatnagar Gross Krook approach on the Lattice Boltzmann method to obtain an explicit form of the Lattice Boltzmann Bhatnagar Gross Krook equations. The momentum equations which resulting by Lattice Boltzmann Bhatnagar Gross Krook equations is exactly same as Navier Stokes equations. Then by adding some cases of plaque on simulation domain, changes in arterial blood flow pressure can be analyzed. The area and shape of the plaque causes narrowing the artery vessels so that plaque can affect the pressure and rate of blood flow dynamically. The pressure of blood flow without plaque is stable ranged from 124.21 to 124.22 mmHg. While in the vessels with plaque, blood flow pressure increased significantly up to 124.274 mmHg.

**Keywords:** blood flow pressure, bhatnagar gross krook, incompressible fluid, lattice boltzmann method, arterial vessels, navier stokes equations