# Leveraging Theory From Cosmodynamics for Multi-Scale Cardiovascular Simulation

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## ABSTRACT

We present a computational method for simulation of cardiovascular blood flow based on the Lattice Boltzmann method to model the blood flow in large-scale arterial systems. This work extends previously published studies using static geometries to include both pulsatile flow and the effect of the pulsating heart on the coronary arteries. We provide here the derivation for introducing the deformational forces exerted on the arterial flows from the movement of the heart by borrowing concepts from cosmodynamics. The deformational forces are then cast into the kinetic formalism by using a Gauss-Hermite projection procedure. In this presentation, we will discuss the impact of these additional forces on the endothelial shear stress, a quantity associated with the localization and progression of heart diseases like atherosclerosis.

## REFERENCES

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