



# Akbari-Ganji Homotopy Perturbation Method for Analyzing the Pulsatile Blood Flow in Tapered Stenosis Arteries under the Effect of Magnetic Field together with the Impact of Mass and Heat Transfer

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## Abstract

The two-dimensional pulsatile blood flow in tapered stenosis arteries under the effect of a Magnetic field with mass and heat transfer was analyzed by using a new analytical method called the Akbari-Ganji homotopy perturbation method (AGHPM). This technique is based on integrating the Akbari-Ganji and the homotopy perturbation methods. We succeeded in developing the mathematical model studied by researchers Liu and Liu by adding the effect of the magnetic field of blood flow in addition to the effect of mass and heat transfer on it, this developed model has not been studied before. In the two states (absence and presence) of a magnetic field; the axial velocity, the wall shear stress, flow resistance and volumetric flow rate were investigated under the impact of the angle of tapering, the Grashof number, the solutal Grashof number and magnetic field. The results show that in the case of the absence magnetic field there is good agreement with the previous study made by the researchers Liu and Liu, while in the case of the presence magnetic field it is noted that when the magnetic field increases from 2 to 6, the velocity and flow rate decrease, but in contrast the wall shear stress and resistance flow increases. Moreover, the results establish that AGHPM is effective and extremely accurate in determining the analytical approximate solution for pulsatile blood flow in tapered stenosis arteries under magnetic field influence. Furthermore, the graphs of this novel solution demonstrate the validity, usefulness, and substantiality of AGHPM, and are consistent with the results of earlier investigations.

**Keywords:** Akbari-Ganji method; blood flow; homotopy perturbation method; tapered stenosis arteries; magnetic field; mass and heat transfer.

## 1. Main text

The study of bio-fluid dynamics has received a great deal of attention from many researchers and scientists in the last years, especially concerning the facets of the system of human cardiovascular. The source of this tremendous interest is due to the fact that the system of the human cardiovascular is the inner transfer of fluids with multiple offshoots of the arteries along which an intricate flow of blood circulates. There are many different cardiovascular diseases, a stenosis is one of these main diseases that infects the arteries and affects the process of the blood flow.

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