

Documents

Kadhim, S.K., Nasif, M.S., Al-Kayiem, H.H., Thirumalaiswamy, N., Waked, R.A.

Effect of induced vibration on the blood flow properties in a mechanical aortic valve

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Abstract

The effect of induced vibration on velocity distribution for the blood flow in the bileaflet mechanical heart valves conveying blood was investigated in this study. The bileaflet valve was simulated as an orifice. The induced vibration is due to the pulsed blood flow in the artery. Results presented in this study were performed using CFD FLUENT software. This analysis is based on the non-linear numerical solution by using a finite-element method, for the system of governing partial differential equations (continuity, momentum) of Navier - Stokes equation of blood flow through the orifice. It has been found that as the flow through the orifice increased, the vibration at the orifice inlet increased. For steady state conditions, at Reynolds number 50 the recorded frequency was 20Hz. When the Reynolds number increased to 100 due to the increase in the blood flow the recorded frequency increased to 30Hz. The increase in frequency may result in damaging the blood red cells and platelets which subsequently results in increasing the blood clogging downstream of the orifice. © 2014 Owned by the authors, published by EDP Sciences.

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