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Mathematical Modeling of Human Cardiovascular System: A Lumped Parameter Approach and Simulation

Authors : Ketan Naik, P. H. Bhathawala

Abstract : The purpose of this work is to develop a mathematical model of Human Cardiovascular System using lumped parameter method. The model is divided in three parts: Systemic Circulation, Pulmonary Circulation and the Heart. The established mathematical model has been simulated by MATLAB software. The innovation of this study is in describing the system based on the vessel diameters and simulating mathematical equations with active electrical elements. Terminology of human physical body and required physical data like vessel’s radius, thickness etc., which are required to calculate circuit parameters like resistance, inductance and capacitance, are proceeds from well-known medical books. The developed model is useful to understand the anatomic of human cardiovascular system and related syndromes. The model is deal with vessel’s pressure and blood flow at certain time.

Keywords : cardiovascular system, lumped parameter method, mathematical modeling, simulation
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