Cardiovascular Modeling Software Tools in Medicine

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Abstract : The high prevalence of cardiovascular diseases has provoked a raising interest in the development of mathematical models in order to evaluate the cardiovascular function both under physiological and pathological conditions. In this paper, a physical model of the cardiovascular system with intrinsic regulation is presented and implemented by using the object-oriented Modelica simulation software tools. For this task, a multi-compartmental system previously validated with physiological data has been built, based on the interconnection of cardiovascular elements such as resistances, capacitances and pumping among others, by following an electrohydraulic analogy. The results obtained under both physiological and pathological scenarios provide an easy interpretative key to analyze the hemodynamic behavior of the patient. The described approach represents a valuable tool in the teaching of physiology for graduate medical and nursing students among others.

Keywords : cardiovascular system, MODELICA simulation software, physical modelling, teaching tool

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