Fluid dynamics of aortic valve stenosis ZAHRA KESHAVARZ-MOTAMED, Mechanical and Industrial Engineering Department, Concordia University, Montreal, Canada, NIMA MAFTOON, Mechanical and Industrial Engineering Department, McGill University, Montreal, Canada — Aortic valve stenosis, which causes considerable constriction of the flow passage, is one of the most frequent cardiovascular diseases and is the most common cause of the valvular replacements which take place for around 100,000 per year in North America. Furthermore, it is considered as the most frequent cardiac disease after arterial hypertension and coronary artery disease. The objective of this study is to develop an analytical model considering the coupling effect between fluid flow and elastic deformation with reasonable boundary conditions to describe the effect of AS on the left ventricle and the aorta. The pulsatile and Newtonian blood flow through aortic stenosis with vascular wall deformability is analyzed and its effects are discussed in terms of flow parameters such as velocity, resistance to flow, shear stress distribution and pressure loss. Meanwhile we developed analytical expressions to improve the comprehension of the transvalvular hemodynamics and the aortic stenosis hemodynamics which is of great interest because of one main reason. To medical scientists, an accurate knowledge of the mechanical properties of whole blood flow in the aorta can suggest a new diagnostic tool.

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