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**Quantifying the Energy Loss in Aortic Stenosis through Fluid-Structure Interaction** RANA ZAKERZADEH[1], Duquesne University — Supravalvular aortic stenosis is a defect accompanied by a narrowing of the ascending aorta and the stenosed area is subjected to abnormal hemodynamics and pressure drop. The pressure gradient across the stenosed region indicates the energy loss of the blood flow and is indicative of the extra work for the muscle of the left ventricle. The goal of this work is to develop a novel modeling approach to determine the accurate prediction of the pressure drop across the stenotic. We develop a computational method to simulate the propagation of pressure waves and the related arterial wall deformation. Blood is modeled using Navier-Stokes equations and the arterial wall consists of a thick material which accounts for the media and adventitia. Model simulations of the aortic blood flow under physiological conditions were performed using finite element method. The energy estimation is derived from weak formulation and applied to the stenosed artery to assess energy loss. The numerical simulations investigate the relation between the flow condition, pressure gradient and wall deformation for different levels of stenosis to cover the broad range in the degree of narrowing, ranging from trivial to severe.

[1]Membership Pending

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