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Aortic Wall Shear Analysis from Asymmetric Prosthetic Heart Valve Design ALEXANDROS ROSAKIS, MORTEZA GHARIB, California Institute of Technology — Asymmetrically stiffened aortic trileaflet valve leaflets can divert the systolic flow away from the stiffened leaflets and into the wall of the aortic root. Asymmetrical stiffening of the aortic valve can be caused by aortic valve stenosis. We show the different flow profiles caused by different combinations of stiffened and unstiffened leaflets. Furthermore, we describe how this asymmetric stiffening alters the wall shear stress on a model aorta. This investigation can be used to better understand disease states in patients with aortic valve stenosis. Moreover, understanding the effects of asymmetric leaflet stiffening on the aortic flow may allow us to design patient specific prosthetic polymer heart valves. These valves would have carefully tuned leaflet thicknesses that would direct the systolic flow in a way that minimizes damage to the patient's aortic wall and better resembles natural healthy heart valves.

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