

Abstract Submitted  
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**Particle Image Velocimetry studies of bicuspid aortic valve hemodynamics**<sup>1</sup> NEELAKANTAN SAIKRISHNAN, CHOON-HWAI YAP, AJIT P. YOGANATHAN, Georgia Institute of Technology — Bicuspid aortic valves (BAVs) are a congenital anomaly of the aortic valve with two fused leaflets, affecting about 1-2% of the population. BAV patients have much higher incidence of valve calcification & aortic dilatation, which may be related to altered mechanical forces from BAV hemodynamics. This study aims to characterize BAV hemodynamics using Particle Image Velocimetry(PIV). BAV models are constructed from normal explanted porcine aortic valves by suturing two leaflets together. The valves are mounted in an acrylic chamber with two sinuses & tested in a pulsatile flow loop at physiological conditions. 2D PIV is performed to obtain flow fields in three planes downstream of the valve. The stenosed BAV causes an eccentric jet, resulting in a very strong vortex in the normal sinus. The bicuspid sinus vortex appears much weaker, but more unstable. Unsteady oscillatory shear stresses are also observed, which have been associated with adverse biological response; characterization of the hemodynamics of BAVs will provide the first step to understanding these processes better. Results from multiple BAV models of varying levels of stenosis will be presented & higher stenosis corresponded to stronger jets & increased aortic wall shear stresses.

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