Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Virtual Cardiac Surgery Using CFD: Application to Septal Myectomy in Obstructive Hypertrophic Cardiomyopathy[1] VIJAY VEDULA, RAJAT MITTAL, THEODORE ABRAHAM, The Johns Hopkins University — Obstructive hypertrophic cardiomyopathy (HOCM) is characterized by ventricular wall thickening, diastolic dysfunction, and dynamic outflow tract obstruction, all of which strongly influence the vortex dynamics and pressure distribution in the left ventricle (LV). Severe cases of HCM are usually managed through septal myectomy where the surgeon resects the hypertrophic mass. Surgeons currently try to remove as much tissue as possible in order to optimize the post surgical result. However, excessive debulking increases the chance of ventricular septal defects, bundle branch block or complete heart block, and aneurysmal septal thinning. On the other hand, insufficient tissue removal also leads to unsatisfactory outcomes in terms of reduction of outflow tract pressure gradient. Knowing how much muscle to remove and where to remove it from could reduce the likelihood of complications and suboptimal outcomes. In the present study, we employ an immersed boundary solver to model the effect of septal myectomy for ventricles with HOCM and demonstrate the potential of such an approach for surgical planning.

[1]Computational resources were provided by the National Institute of Computational Science under Tergrid grant number TG-CTS100002

Rajat Mittal
The Johns Hopkins University

Date submitted: 05 Aug 2011 Electronic form version 1.4