Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Impact of surgical shape on blood flow pattern for patient specific coronary artery bypass graft (CABG) surgery SETHURAMAN SANKARAN, Postdoctoral fellow, UCSD, ALISON MARSDEN, Assitant Professor, UCSD — We present a numerical framework for studying blood flow patterns in patients who have undergone coronary artery bypass surgeries. We use a stabilized finite element framework for performing blood flow simulations. Specialized lumped parameter boundary conditions for the coronary arteries, aorta and its branches are utilized. Computational models of CABG patients are constructed from CT scan images. A comprehensive study of how surgical shape affects hemodynamics in patient-specific CABG surgery has not been performed till date. The objective of this work is to study the effect of surgical geometry on blood flow pattern, especially downstream and in the proximity of the suture locations of the bypass graft. Quantities such as energy efficiency, wall shear stresses and its gradients and oscillatory shear index are extracted and compared for different surgical shapes in a systematic fashion. A framework and results for robust optimization of bypass graft anastomoses in unsteady flow will be presented. Implications of surgical geometry on graft patency will be discussed.

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Date submitted: 05 Aug 2010 Electronic form version 1.4