Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Intraventricular flow alterations due to dyssynchronous wall motion[1] AUDREY M. POPE, Stillwater High School, HONG KUAN LAI, MILAD SAMAEE, ARVIND SANTHANAKRISHNAN, Oklahoma State University — Roughly 30% of patients with systolic heart failure suffer from left ventricular dyssynchrony (LVD), in which mechanical discoordination of the ventricle walls leads to poor hemodynamics and suboptimal cardiac function. There is currently no clear mechanistic understanding of how abnormalities in septal-lateral (SL) wall motion affects left ventricle (LV) function, which is needed to improve the treatment of LVD using cardiac resynchronization therapy. We use an experimental flow phantom with an LV physical model to study mechanistic effects of SL wall motion delay on LV function. To simulate mechanical LVD, two rigid shafts were coupled to two segments (apical and mid sections) along the septal wall of the LV model. Flow through the LV model was driven using a piston pump, and stepper motors coupled to the above shafts were used to locally perturb the septal wall segments relative to the pump motion. 2D PIV was used to examine the intraventricular flow through the LV physical model. Alterations to SL delay results in a reduction in the kinetic energy (KE) of the flow field compared to synchronous SL motion. The effect of varying SL motion delay from 0% (synchronous) to 100% (out-of-phase) on KE and viscous dissipation will be presented.

[1]This research was supported by the Oklahoma Center for Advancement of Science and Technology (HR14-022).

Arvind Santhanakrishnan
Oklahoma State University

Date submitted: 01 Aug 2015 Electronic form version 1.4