

Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Correlation of Left Ventricle Hydrodynamic Parameters with Diastolic Dysfunction¹ KELLEY STEWART, Virginia Tech, RAHUL KUMAR, Wake Forest University, JOHN CHARONKO, PAVLOS VLACHOS, Virginia Tech, WILLIAM LITTLE, Wake Forest University — Cardiac flows are by nature intricate, involving unsteadiness, and transition to turbulence. In the presence of disease, their complexity is increased and the pumping efficiency of the left heart is compromised. Color M-mode echocardiography, used herein, can provide valuable clinical data, however their physical interpretation is often lacking. The present work is based on the notion that the normal diastolic filling pattern in the left ventricle (LV) is disrupted by diastolic dysfunction (DD). As such, a LV filling efficiency parameter incorporating intraventricular pressure differences and a novel break-point vortex ring propagation velocity, calculated by a statistical change point algorithm has been developed to characterize the effectiveness of diastole and its subsequent decline because of DD. An automated algorithm analyzed clinical data from 125 patients spanning the 4 stages of DD. The results provide insight on the significance of the various parameters on the progression of DD and provide a novel approach for understanding clinical echo data.

¹This material is based upon work supported under a NSF Graduate Research Fellowship.

Kelley Stewart
Mechanical Engineering, Virginia Tech

Date submitted: 06 Aug 2008

Electronic form version 1.4