Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Lagrangian coherent structures in the left ventricle in the presence of aortic valve regurgitation GIUSEPPE DI LABBIO, Concordia University, JEROME VETEL, Ecole Polytechnique de Montreal, LYES KADEM, Concordia University — Aortic valve regurgitation is a rather prevalent condition where the aortic valve improperly closes, allowing filling of the left ventricle of the heart to occur partly from backflow through the aortic valve. Although studies of intraventricular flow are rapidly gaining popularity in the fluid dynamics research community, much attention has been given to the left ventricular vortex and its potential for early detection of disease, particularly in the case of dilated cardiomyopathy. Notably, the subsequent flow in the left ventricle in the presence of aortic valve regurgitation ought to be appreciably disturbed and has yet to be described. Aortic valve regurgitation was simulated *in vitro* in a double-activation left heart duplicator and the ensuing flow was captured using two-dimensional time-resolved particle image velocimetry. Further insight into the regurgitant flow is obtained by computing attracting and repelling Lagrangian coherent structures. An interesting interplay between the two inflowing jets and their shear layer roll-up is observed for various grades of regurgitation. This study highlights flow features which may find use in further assessing regurgitation severity.

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Date submitted: 31 Jul 2017 Electronic form version 1.4