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**Characterization of human left ventricle flow patterns using ultrasound and Lagrangian coherent structures** SAHAR HENDABADI, Illinois Institute of Technology, JUAN CARLOS DEL ALAMO, University of California, San Diego, YOLANDA BENITO, RAQUEL YOTTI, JAVIER BERMEJO, Department of Cardiology, Hospital General Universitario Gregorio Marañón, Madrid, Spain, SHAWN SHADDEN, Illinois Institute of Technology — We discuss work towards understanding human left ventricle (LV) transport and mixing characteristics in normal subjects and patients with dilated cardiomyopathy. Prior studies have shown that the fluid dynamics in the left ventricle (LV) play a major role in dictating overall cardiac health. This study utilizes a noninvasive method to obtain planar velocity data over the apical long-axis view of the LV from color Doppler and B-mode ultrasound measurements. We use a Lagrangian measure to study unsteady behavior of blood transport inside the LV. We compute finite-time Lyapunov exponent (FTLE) fields to extract Lagrangian coherent structures (LCS) from the empirical data. This application presents a particular challenge to Lagrangian computations due to the presence of moving flux, and no-flux, boundaries. We describe a method for unstructured grid generation from the LV motion, and LCS computation on the deforming unstructured grid. Results demonstrate that LCS reveal the moving boundaries confining the blood volume injected to the LV in diastole and ejected into the aorta in systole. We discuss findings related to the quantification of the LV vortex, whose geometry and motion is thought to be an important indicator of cardiac health.

Sahar Hendabadi
Illinois Institute of Technology

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