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Influence of the heart rate and atrioventricular delays on vortex evolution and blood transport inside the left ventricle[1] SAHAR HENDABADI, llinois Institute of Technology, PABLO MARTINEZ-LEGAZPI, University of California, San Diego, YOLANDA BENITO, JAVIER BERMEJO, Cardiology Department, Hospital Gregorio Maranon, Madrid, Spain, JUAN CARLOS DEL ALAMO, University of California, San Diego, SHAWN SHADDEN, University of California, Berkeley — Cardiac resynchronization therapy (CRT) is used to help restore coordinated pumping of the ventricles by overcoming delays in electrical conduction due to cardiac disease. This is accomplished by a specialized cardiac pacemaker that is able to adjust the atrioventricular (AV) delay.A major clinical challenge is to adjust the pacing strategy to best coordinate the blood flow mechanics of ventricular filling and ejection. To this end, we have studied the difference in the vortex formation and its evolution inside the left ventricle (LV) for 4 different AV delays in a cohort of patients with implanted pacemakers. A reconstruction algorithm was used to obtain 2D velocity over the apical long-axis view of the LV from color Doppler and B-mode ultrasound data. To study blood transport, we have identified Lagrangian coherent structures to determine moving boundaries of the blood volumes injected to the LV in diastole and ejected to the aorta in systole. In all cases, we have analyzed the differences in filling and ejection patterns and the blood transport during the E-wave and A-wave formation.Finally we have assessed the influence of the AV delay on 2 indices of stasis, direct flow and residence time.The findings shed insight to the optimization of AV delays in patients undergoing CRT.

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Sahar Hendabadi
llinois Institute of Technology

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