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**Experimental study of the intraventricular filling vortex in diastolic dysfunction** ARVIND SANTHANAKRISHNAN, MILAD SAMAEE, NICHOLAS NELSEN, Oklahoma State University — Heart failure with normal ejection fraction (HFNEF) is a clinical syndrome that is prevalent in over half of heart failure patients. HFNEF patients typically show diastolic dysfunction, caused by a decrease in relaxation capability of the left ventricular (LV) muscle tissue and/or an increase in LV chamber stiffness. Numerous studies using non-invasive medical imaging have shown that an intraventricular filling vortex is formed in the LV during diastole. We conducted 2D particle image velocimetry and hemodynamics measurements on a left heart simulator to investigate diastolic flow under increasing LV wall stiffness, LV wall thickness and heart rate (HR) conditions. Flexible-walled, optically clear LV physical models cast from silicone were fitted within a fluid-filled acrylic chamber. Pulsatile flow within the LV model was generated using a piston pump and 2-component Windkessel elements were used to tune the least stiff (baseline) LV model to physiological conditions. The results show that peak circulation of the intraventricular filling vortex is diminished in conditions of diastolic dysfunction as compared to the baseline case. Increasing HR exacerbated the circulation of the filling vortex across all cases.

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