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Computational study of the effect of dynamic wall confinement on ventricular filling XUDONG ZHENG, QIAN XUE, University of Maine — Ventricular filling is a major cardiac phase in which the freshly oxygenated blood in the left atrium (LA) enters the left ventricle (LV). There is an increasing consensus that dynamics of transmitral blood flow during filling plays a critical role in dictating overall cardiac health and predicting early changes in cardiac function. The ventricular flow during filling is determined by the interplay of incoming mitral jet and myocardial wall confinement and manifested by a complex morphing pattern of an asymmetric vortex ring. In the current study, we employ computational simulations to explore the effects of dynamic wall confinement on ventricular flow in an idealized left ventricle model. The effects of radial and longitudinal confinement as well as wall motion will be investigated, with special interests on vortex dynamics, such as vortex ring tilting, pinch off and breakdown, intraventricular pressure drop, filling velocity, energy dissipation and blood mixing.

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