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Computational Modeling of the Effects of Myocardial Infarction on Left Ventricular Hemodynamics[1] VIJAY VEDULA, JUNG HEE SEO, RAJAT MITTAL, Johns Hopkins University, STEFANIA FORTINI, GIORGIO QUERZOLI, University of Roma La Sapienza — Most in-vivo and modeling studies on myocardial infarction and ischemia have been directed towards understanding the left ventricular wall mechanics including stress-strain behavior, end systolic pressure-volume correlations, ejection fraction and stroke work. Fewer studies have focused on the alterations in the intraventricular blood flow behavior due to local infarctions. Changes in the motion of the endocardium can cause local circulation and stagnation regions; these increase the blood cell residence time in the left ventricle and may eventually be implicated in thrombus formation. In the present study, we investigate the effects of myocardial infarction on the ventricular hemodynamics in simple models of the left ventricle using an immersed-boundary flow solver. Apart from the Eulerian flow features such as vorticity and velocity flow fields, pressure distribution, shear stress, viscous dissipation and pump work, we also examine the Lagrangian dynamics of the flow to gain insights into the effect of flow dynamics on thrombus formation. The study is preceded by a comprehensive validation study which is based on an in-vitro experimental model of the left ventricle and this study is also described.

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