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Flow-Induced Mitral Leaflet Motion in Hypertrophic Cardiomyopathy VALENTINA MESCHINI, Gran Sasso Science Institute, RAJAT MITTAL, Johns Hopkins University, ROBERTO VERZICCO, University of Roma Tor Vergata — Hypertrophic cardiomyopathy (HCM) is considered the cause of sudden cardiac death in developed countries. Clinically it is found to be related to the thickening of the intra-ventricular septum combined with elongated mitral leaflets. During systole the low pressure, induced by the abnormal velocities in the narrowed aortic channel, can attract one or both the mitral leaflets causing the aortic obstruction and sometimes instantaneous death. In this paper a fluid structure interaction model for the flow in the left ventricle with a native mitral valve is employed to investigate the physio-pathology of HCM. The problem is studied using direct numerical simulations of the Navier-Stokes equations with a two-way coupled structural solver based on interaction potential approach for the structure dynamics. Simulations are performed for two different degrees of hypertrophy, and two values of pumping efficiency. The leaflets dynamics and the ventricle deformation resulting from the echocardiography of patients affected by HCM are well captured by the simulations. Moreover, the procedures of leaflets plication and septum myectomy are simulated in order to get insights into the efficiency and reliability of such surgery.

Valentina Meschini
Gran Sasso Science Institute

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