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Clinical characterization of 2D pressure field in human left ventricles MARIA BORJA, LORENZO ROSSINI, PABLO MARTINEZ-LEGAZPI, UC San Diego, YOLANDA BENITO, MARTA ALHAMA, RAQUEL YOTTI, CANDELAS PEREZ DEL VILLAR, ANA GONZALEZ-MANSILLA, ALICIA BARRIO, FRANCISCO FERNANDEZ-AVILES, JAVIER BERMEJO, Hospital Gregorio Maranon, Madrid, Spain, ANDREW KHAN, JUAN CARLOS DEL ALAMO, UC San Diego — The evaluation of left ventricle (LV) function in the clinical setting remains a challenge. Pressure gradient is a reliable and reproducible indicator of the LV function. We obtain 2D relative pressure field in the LV using in-vivo measurements obtained by processing Doppler-echocardiography images of healthy and dilated hearts. Exploiting mass conservation, we solve the Poisson pressure equation (PPE) dropping the time derivatives and viscous terms. The flow acceleration appears only in the boundary conditions, making our method weakly sensible to the time resolution of in-vivo acquisitions. To ensure continuity with respect to the discrete operator and grid used, a potential flow correction is applied beforehand, which gives another Poisson equation. The new incompressible velocity field ensures that the compatibility equation for the PPE is satisfied. Both Poisson equations are efficiently solved on a Cartesian grid using a multi-grid method and immersed boundary for the LV wall. The whole process is computationally inexpensive and could play a diagnostic role in the clinical assessment of LV function.

Lorenzo Rossini
Univ of California - San Diego

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