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Computational analysis of an aortic valve jet SHAWN C. SHADDEN, Illinois Institute of Technology, MATTEO ASTORINO, JEAN-FRÉDÉRIC GERBEAU, INRIA Rocquencourt — In this work we employ a coupled FSI scheme using an immersed boundary method to simulate flow through a realistic deformable, 3D aortic valve model. This data was used to compute Lagrangian coherent structures, which revealed flow separation from the valve leaflets during systole, and correspondingly, the boundary between the jet of ejected fluid and the regions of separated, recirculating flow. Advantages of computing LCS in multi-dimensional FSI models of the aortic valve are twofold. For one, the quality and effectiveness of existing clinical indices used to measure aortic jet size can be tested by taking advantage of the accurate measure of the jet area derived from LCS. Secondly, as an ultimate goal, a reliable computational framework for the assessment of the aortic valve stenosis could be developed.

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