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Visualization of Simulated Endothelial Shear Stress and Blood Flow in Coronary Arteries MICHELLE BORKIN, Harvard University, CHARLES L. FELDMAN, Brigham and Women's Hospital, Harvard Medical School, HANSPETER PFISTER, Harvard University, SIMONE MELCHIONNA, Swiss Federal Institute of Technology, EPFL, EFTHIMIOS KAXIRAS, Harvard University — Low endothelial shear stress (ESS) identifies areas of atherosclerotic disease lesion formation in the coronary arteries. However, it is impossible to directly measure ESS *in vivo* for an entire arterial tree. As part of the Multiscale Hemodynamics Project, computed tomography angiography (CTA) data is being used to obtain patient specific heart and coronary system geometries and then MUPHY, a multi-physics and multi-scale simulation code combining microscopic Molecular Dynamics (MD) with a hydro-kinetic Lattice Boltzmann (LB) method, is applied in order to simulate blood flow through the coronary arteries. Having effective visualizations of the simulation's multidimensional output, including ESS, is vital for the quick and thorough non-invasive evaluation of the patient. To this end, we have developed new visualization tools and techniques to make the simulation's output useful in a clinical diagnostic setting, examined the effectiveness of 2D versus 3D representations, and explored blood flow representations. The visualization methods developed are also applicable to other areas of fluid dynamics.

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