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Towards Blood Flow Velocimetry with X-Ray CT[1] BRENDAN COLVERT, ERIC YU, FRANCISCO CONTIJOCH, ELLIOT MCVEIGH, University of California San Diego — Cardiovascular disease (CVD) is a tremendous burden in terms of morbidity, mortality, and costs to the healthcare system. Various forms of CVD including atherosclerosis, valve and ventricular dysfunction, aneurysms, and thrombogenesis are associated with localized blood flow abnormalities. Accordingly, the ability to noninvasively interrogate physiological flows enables identification and diagnosis of disease, monitoring of therapies, and research on the hemodynamics of CVD. In the clinic, blood flow measurements are primarily made using phase contrast magnetic resonance imaging (PC-MRI) and ultrasonic color Doppler imaging. Certain limitations of these techniques for patients who have contraindications or suffer from arrhythmias, as well as the desire for volumetric flow information necessitate the development of a new modality for blood flow velocimetry. In this work, we propose a strategy to optimally integrate imaging data from contrast-enhanced X-ray CT scans with flow solvers. We evaluate the effectiveness of this strategy in the context of a simplified flow model. Our initial findings provide insight into the theoretical foundations of the proposed technique and lay the groundwork for further research on the use of X-ray CT for blood flow velocimetry.

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