Abstract Submitted
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Computational Hemodynamics of Prosthetic Aortic Valves with Application to Continuous Monitoring of Valve Function[1] SHANTANU BAILOOR, JUNG-HEE SEO, Johns Hopkins University, HODA HATOUM, LAKSHMI PRASAD DASI, Ohio State University, RAJAT MITTAL, Johns Hopkins University, JOHNS HOPKINS UNIVERSITY TEAM, OHIO STATE UNIVERSITY TEAM — Transcatheter heart valves suffer from complications such as leaks, thrombosis, endocarditis etc. Of these, sub-clinical or clinical thrombosis, even if resolved by anti-coagulation therapy, impacts the long-term durability of the valve. Technology to help avoid these complications and detect them very early is key towards advancing heart valve therapy. A small number of wireless pressure microsensors mounted at strategic locations on the valve frame could enable continuous monitoring and alerting to very early- stages of thrombosis or other complications, as well as to guide anti-coagulation therapy or other clinical management. We employ hemodynamics simulations of transvalvular flow in a canonical model of the aorta with a transcatheter valve and determine optimal sensor configurations for discriminating between healthy leaflets and those exhibiting reduced mobility. By applying machine-learning based techniques to a large cohort of in-silico aorta models, we demonstrate that a small number of in-situ sensors can effectively predict early-stage leaflet abnormalities.

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