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Accuracy and Robustness Improvements of Echocardiographic Particle Image Velocimetry for Routine Clinical Cardiac Evaluation BRETT MEYERS, PAVLOS VLACHOS, Purdue Univ, JOHN CHARONKO, Los Almos National Labs, MATTHEW GIARRA, Virginia Tech, CRAIG GOERGEN, Purdue Univ — Echo Particle Image Velocimetry (echoPIV) is a recent development in flow visualization that provides improved spatial resolution with high temporal resolution in cardiac flow measurement. Despite increased interest a limited number of published echoPIV studies are clinical, demonstrating that the method is not broadly accepted within the medical community. This is due to the fact that use of contrast agents are typically reserved for subjects whose initial evaluation produced very low quality recordings. Thus high background noise and low contrast levels characterize most scans, which hinders echoPIV from producing accurate measurements. To achieve clinical acceptance it is necessary to develop processing strategies that improve accuracy and robustness. We hypothesize that using a short-time moving window ensemble (MWE) correlation can improve echoPIV flow measurements on low image quality clinical scans. To explore the potential of the short-time MWE correlation, evaluation of artificial ultrasound images was performed. Subsequently, a clinical cohort of patients with diastolic dysfunction was evaluated. Qualitative and quantitative comparisons between echoPIV measurements and Color M-mode scans were carried out to assess the improvements delivered by the proposed methodology.

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