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Doppler variance analysis for high sensitivity morphological OCT imaging[1] FARZANA ZAKI, New Jersey Institute of Technology, Department of Electrical and Computer Engineering, DYLAN RENAUD, New Jersey Institute of Technology, Department of Physics, BENJAMIN LITVIN, NISHAT SADIA, JAMIA GILLES, XUAN LIU, New Jersey Institute of Technology, Department of Electrical and Computer Engineering — Optical coherence tomography (OCT) is a cross-sectional imaging modality based on light interferometry. While the magnitude of an OCT signal is generally used for sample structural imaging, sample information is also encoded in the phase of the signal. In particular, the phase of an OCT signal varies with sub-resolution change in optical path length. This behavior can be exploited to track sample displacement with sub-nanometer sensitivity. For example, in prior studies Doppler phase shift has been extracted from phase-resolved OCT signals for vasculature visualization, blood flow measurement, and optical coherence elastography. In addition, the spatial variation of Doppler phase is closely related to morphological characteristics of the sample. In this work, we describe a Doppler variance OCT (DV-OCT) technology that generates morphological images using both the amplitude and phase of a complex OCT signal through Doppler variance analysis. Our results suggest that DV-OCT has better signal to noise ratio performance and sensitivity compared to amplitude OCT imaging, while preserving spatial resolution for morphological characterization of the sample.

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