

# NUMERICALLY FOCUSED 3D OPTICAL COHERENCE MICROSCOPY WITH STRUCTURED ILLUMINATION

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## ABSTRACT

Numerical focusing in optical coherence tomography/microscopy (OCT/OCM) allows for avoiding scanning the optical focus position [1]. In combination with the 3D imaging capability of OCT/OCM it is very prospective for high-speed high-resolution in vivo 3D imaging. The use of specific illumination structure allows for further improvement of the transverse resolution while preserving the possibility of effective numerically focused 3D imaging [2]. This report discusses the properties, advantages and challenges of high-resolution numerically focused 3D imaging with structured illumination (SI) OCM.

Fig. 1 presents the imaging results with SI full-field (FF) swept-source (SS) OCM utilizing for a single 3D image two frequency scans with two illumination directions each. Figs. 1 (a) and (b) illustrate the formation of transverse spatial spectra of en face signals, corresponding to imaging a defocused USAF 1951 resolution test target. Fig. 1(c) presents an orthoslice pseudocolor view of a fragment of numerically focused 3D data, corresponding to imaging an orange sample.

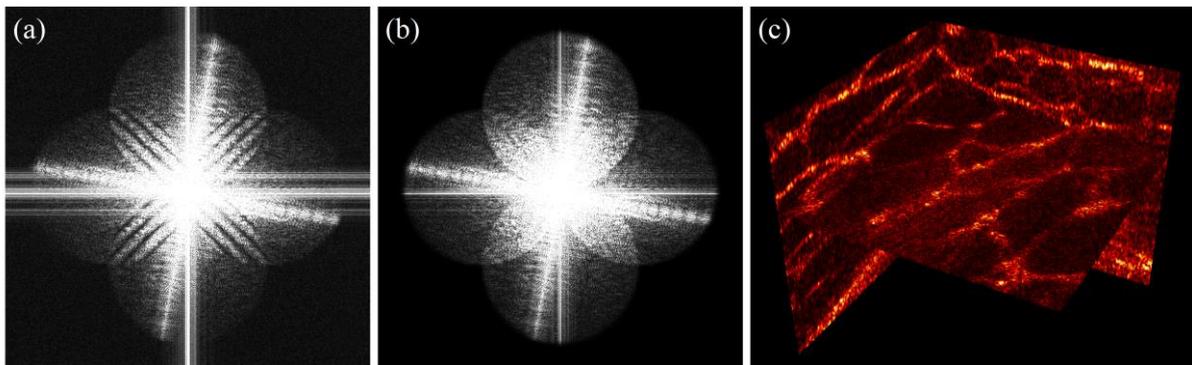


Figure 1: Transverse spatial spectra of en face signals without (a) and with (b) application of the numerical focusing procedure; (c) imaging example.

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[1] W. Drexler and J. G. Fujimoto eds., *Optical coherence tomography*, (Springer International Publishing Switzerland, 2015).

[2] A. A. Grebenyuk, L. Ginner, and R. A. Leitgeb, "Numerically focused full-field swept-source optical coherence microscopy with structured illumination," *Opt. Express* **26**, 33772-33782 (2018).