TOWARDS FEMTOSECOND DIGITAL LENSLESS HOLOGRAPHIC MICROSCOPY

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The coherence properties of light determine the performance of digital holographic microscopy (DHM). While two-arm DHM needs both temporal and spatial coherence to operate properly, the single-arm DHM relaxes the requirements over the former. For both architectures continuous wave lasers have been the preferred light sources because they simplify the experimental set-ups. New radiation sources are now used in DHM for optimizing its performance and/or to explore new fields of application \cite{1, 2}. Femtosecond lasers have been proposed recently for both DHM architectures \cite{3, 4}. For two-arm DHM, the limited coherence time imposes experimental configurations with very short optical path differences and compensating devices for extending the field of interference \cite{3, 5}. Since the single-arm DHM relaxes the restrictions over the time coherence \cite{4}, it simplifies the utilization of femtosecond lasers. Among the several techniques to perform single-arm DHM, the digital lensless holographic microscopy (DLHM) \cite{6} is perhaps the simplest and most versatile implementation. In this contribution the use of femtosecond laser radiation in DLHM is presented. The need of producing a spherical wave to illuminate the sample introduces compromises between the peak- and average-power that must be managed carefully. The envisaged applications of femtosecond DLHM encourage the seeking of adequate compromises for the method to work appropriately. As a preliminary result, Fig. 1 shows an image of the reconstruction of a \textit{Syro acarus} from a hologram generated by DLHM with femtosecond laser radiation.

REFERENCES