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Title:Colliding pulse mode-locked lasers as light sources for single-shot holography
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Abstract: So far, concepts for three dimensional biomedical imaging rely on scanning in at least one dimension. Single-shot holography1, in contrast, stores three-dimensional information encoded in an electro-magnetic wave scattered back from a sample in one single hologram. Single-shot holography operates with simultaneous recordings of holograms at different wavelengths. While the lateral sample information is stored in the interference patterns of individual holograms, the depth information is obtained from the spectral distribution at each lateral image point, similar to Fourier-domain optical coherence tomography2. Consequently, the depth resolution of the reconstructed image is determined by the bandwidth of the light source, so that a broadband light source is needed to obtain high depth resolution. Additionally, the holographic material, in which the holograms are stored, restricts the useable bandwidth. A thick photorefractive crystal can store several holograms of different wavelengths at once. As the crystal works best when using a source with a discrete spectrum, a light source is needed that has a spectrum with well distinguishable laser lines. In a proof-of-principle experiment, we use colliding pulse mode-locked (CPM)3 laser diodes as light sources with a comb-like spectrum to demonstrate the concept of single-shot holography by storing multiple holograms at the same time in a photorefractive Rh:BaTiO3 crystal ystal. © 2011 Copyright Society of Photo-Optical

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