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# Holographic Representation: Hologram Plane vs. Object Plane

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## Abstract

Digital holography allows the recording, storage and subsequent reconstruction of both amplitude and phase of the light field scattered by an object. This is accomplished by recording interference patterns that preserve the properties of the original object field essential for 3D visualization, the so-called holograms.

Digital holography refers to the acquisition of holograms with a digital sensor, typically a CCD or a CMOS camera, and to the reconstruction of the 3D object field using numerical methods.

In the current work, the different representations of digital holographic information in the hologram and in the object planes are studied. The coding performance of the different complex field representations, notably Amplitude-Phase and Real-Imaginary, in both the hologram plane and the object plane, is assessed using both computer generated and experimental holograms. The HEVC intra main coding profile is used for the compression of the different representations in both planes, either for experimental holograms or computer generated holograms.

The HEVC intra compression in the object plane outperforms encoding in the hologram plane. Furthermore, encoding computer generated holograms in the object plane has a larger benefit than the same encoding over the experimental holograms. This difference was expected, since experimental holograms are affected by a larger negative influence of speckle noise, resulting in a loss of compression efficiency.

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