

Study Record on CGH

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Abstract

This is a record of the problems I encountered while studying computer-generated holography (CGH) and my attempts to solve them.

1 Hologram Calculation

Q. (2024.07.25) How to calculate a hologram that successfully reconstructs a desired size and resolution 3D image at a desired distance? To display the hologram on a Digital Micromirror Device (DMD), hologram resolution should be fixed to $5\mu m$.

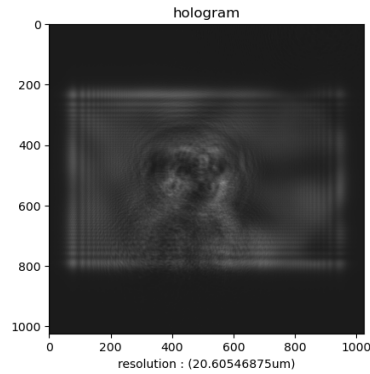


Figure 1: Hologram

2 Aliasing

Q1. (2024.07.25) When performing a Fourier transform on a hologram, weird aliasing occurs as shown below. Why does this happen, and how can it be fixed?

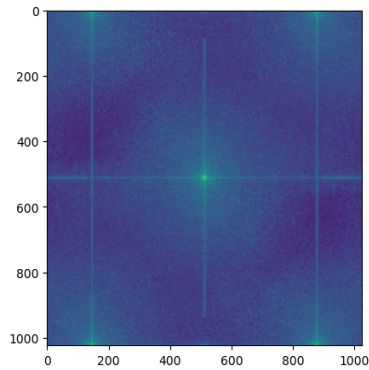


Figure 2: Fourier transform of the hologram

Q2. (2024.07.25) When simulating hologram reconstruction on a computer, aliasing occurs. Why does this happen, and how can it be fixed?

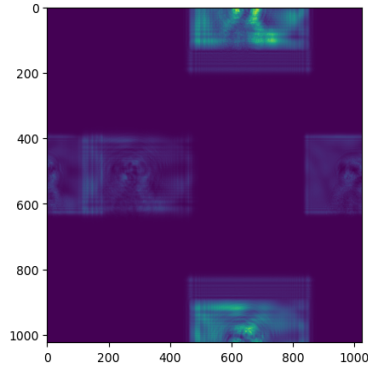


Figure 3: Aliasing in reconstructed image ($\theta = \pi/5$)