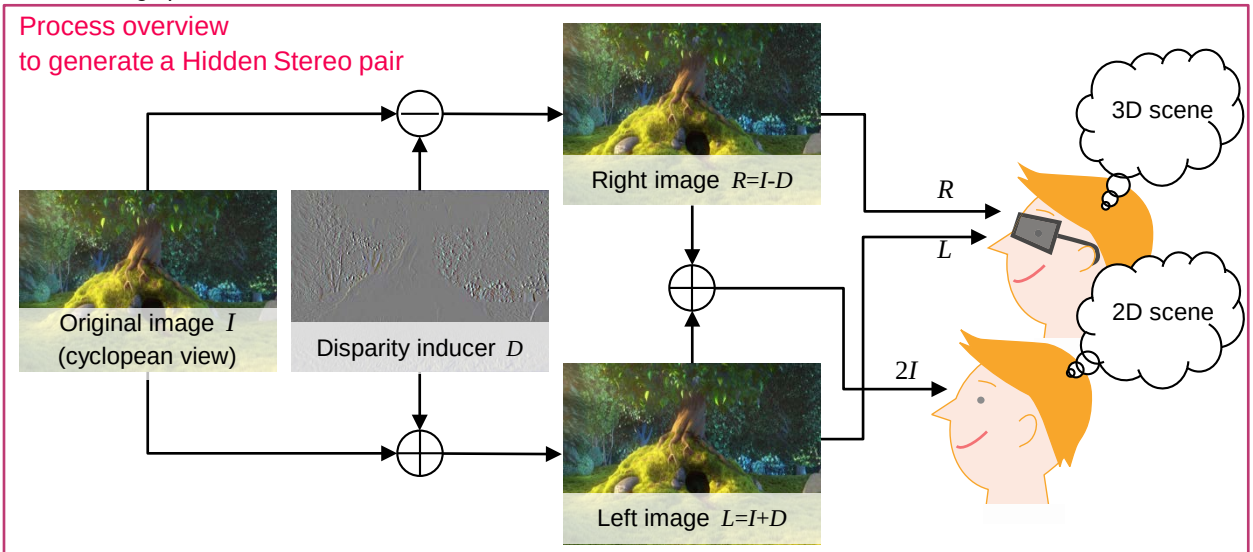
15 Hidden Stereo

- Hiding phase-based disparity for viewers without 3D glasses -

Abstract

When a conventional stereoscopic display is viewed without stereo glasses, image blurs, or “ghosts”, are visible due to the fusion of stereo image pairs. This artifact severely degrades 2D image quality, making it difficult to simultaneously present clear 2D and 3D contents. To overcome this limitation, here we propose a novel method to synthesize ghost-free stereoscopic images. Our method gives binocular disparity to a 2D image, and drives human binocular disparity detectors, by the addition of a quadrature-phase pattern that induces spatial subband phase shifts. The disparity-inducer patterns added to the left and right images are identical except for the contrast polarity. Physical fusion of the two images cancels out the disparity-inducer components and makes only the original 2D pattern visible to viewers without glasses. Unlike previous solutions, our method perfectly excludes stereo ghosts without using special hardware.

Process overview to generate a Hidden Stereo pair

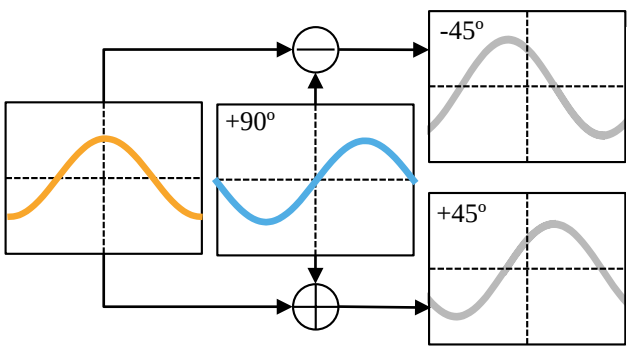


Basic algorithm - giving binocular disparity by the addition of a quadrature-phase pattern

Addition/subtraction of a quadrature-phase (90º)-shifted pattern (blue wave) to/from the original pattern (orange wave) results in a pair of patterns (gray waves) whose phase are shifted in the opposite direction to each other.

Fusion of the pair cancels out the effects of the quadrature-phase pattern and makes the image profile the same as the original wave.

We modulate the amount of phase shift (=disparity size) by adjusting the amplitude of the quadrature-phase pattern.



Reference

[1] T. Fukiage, T. Kawabe, S. Nishida, “Hiding of phase-based stereo disparity for ghost-free viewing without glasses,” *SIGGRAPH2017* (To appear).

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