OpenHolo Algorithm Guide

(Generation::Point Cloud)

Korea Electronics Technology Institute

Generate Fringe Pattern

Amplitude : a_p
Phase : ϕ_p

$a_p(x_p, y_p, z_p)$

$R(\xi, \eta)$
Reference wave

Generation Hologram

η

$O(\xi, \eta)$
Object wave

z

ξ

Hologram Plane

3D Object

Compute pattern for each point cloud

① <Reference wave>

$$R(\xi, \eta) = a_R \exp\left\{-jk\left(\xi \sin\theta_\xi + \eta \sin\theta_\eta\right)\right\}$$

② <Object wave>

$$O(\xi, \eta) = \sum_{p=1}^{N} \frac{a_p}{r_p} exp\left\{j(kr_p + \phi_p)\right\}$$

Distance between p-th point and hologram plane>
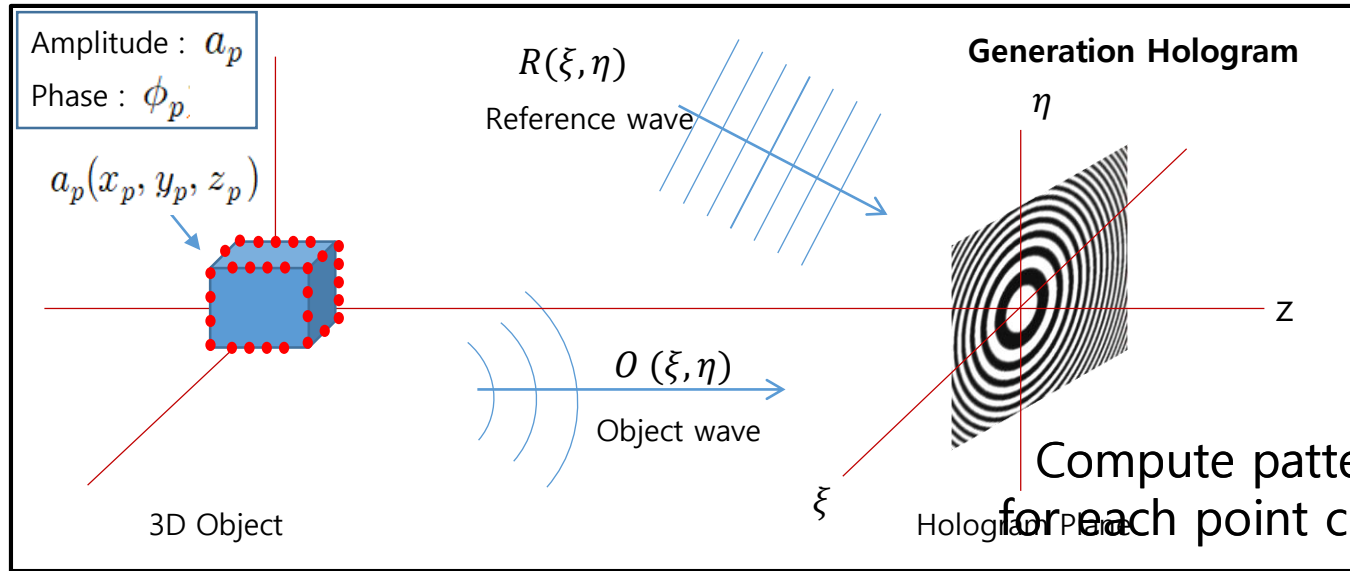
$$r_p = \sqrt{(\xi - x_p)^2 + (\eta - y_p)^2 + z_p^2}$$

③ Intensity of Fringe pattern

$$I(\xi, \eta) = |O + R|^2 = \underline{|O|^2 + |R|^2} + R^*O + RO^*$$

DC term

Reference wave is incident at angles θ_η, θ_ξ with object wave
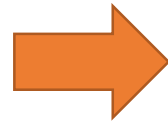
① + **②** = **③** ⟹

$$I(\xi, \eta) = \sum_{i=1}^{N} \frac{a_i}{r_i} \exp(kr_i + k\xi \sin\theta_\xi + k\eta \sin\theta_\eta)$$
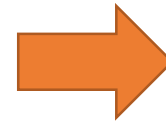
N : Number of Point Clouds

Step of Generating Fringe Pattern
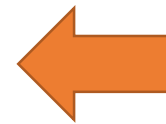

Create 3D Object CG
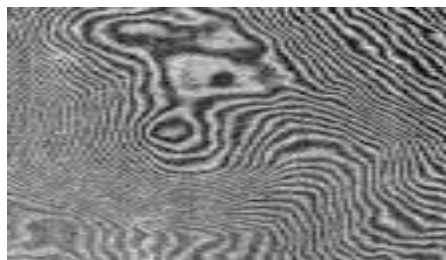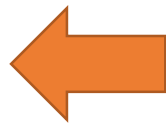(3D Max/MAYA)

Extract Point cloud

Compute pattern
for each point cloud

Integrate of all Point
Clouds

Normalization

Generation
Fringe pattern(bmp)