Learning Implicit Surface Light Fields

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Motivation

Implicit 3D functions have shown impressive results on representing the appearance of objects.

- Arbitrary resolution
- Photorealistic novel view synthesis
- Restricted to a fixed light setting

Implicit representations for modeling the interplay of light and surfaces

Rendering Equation

\[ L(p, v, l, n) = \int_{\Omega} svBRDF(p, r, v) \cdot l(r) \cdot (n^T r) \, dr \]

Our approach: Conditional Implicit Surface Light Field

\[ L_{cSLF}(p, v, l) : \mathbb{R}^3 \times \mathbb{R}^3 \times \mathbb{R}^M \rightarrow \mathbb{R}^3 \]

Conditional Implicit Surface Light Field (cSLF)

A novel appearance representation of 3D objects for rendering novel views and varying the light color and the light location.

Overview

- Single View Prediction
- Generative Model

cSLF from a Single View

Generative Model for cSLF

CSLF of Single Objects

Varying Light Locations

Shadows

Nearest Neighbour

Textures

Image2Image

Ours w/ PE

GT

Complex Lighting

Environment Maps

Latent Space Interpolations