

探討全像立體影像受 LED 光源色彩影響之視覺呈現

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摘 要

全像投影技術在近年來被廣泛運用於各層面，但在展示形式方面的部份限制卻始終無法突破，如點矩陣式全像系統須隨著視點移動而改變色彩，在觀看時不甚便利，本研究試圖從全像影像展示光源的部分切入，以科技媒材「發光二極體 LED」作為重建全像立體影像之主要光源，並在展示形式上與全像立體影像媒材連結，目的在呈現多面向的全像立體影像表現形式及改善全像觀看之方式，為本論文發展之重點。

本研究首先從科技藝術與 LED 現階段之結合做歸納整理，探討 LED 媒材與全像立體影像之關聯性，針對 LED 在藝術表現形式上歸納出色彩多變性、造形多變性、點陣風格特質，並將其特質與全像立體影像結合，建立 LED 媒材應用於全像立體影像的圖像表現原則。透過實驗結果發現，LED 多色光確實對於反射式立體影像、穿透式全像及點矩陣式全像媒材的影像還原有所影響，研究結果如下：

- (1) LED 多色光對於反射式立體影像還原後的明視度有著較顯著的影響，隨著不同的 LED 色光的投射，會改變畫面中之明視度呈現，但色彩表現上無任何變化。
- (2) 在穿透式全像媒材方面，其立體感表現雖無反射式全像突出，但卻在畫面中有色光三原色之加法混色表現與影像的重疊效果。

- (3) 點矩陣式全像媒材突破以往必須隨著視點上下移動才能改變色彩之限制，並可經由控制 LED 的色光變化，便能在水平視點觀看到不同之色彩變化。
- (4) 本研究結果證明，全像立體影像媒材與 LED 多色光之結合，已突破以往全像立體影像在展示形式上的限制，呈現出豐富且全新的視覺感受。



關鍵字: 全像立體影像、LED、發光二極體

A Study on the Visual Representation of Holography Illuminated by LED Light Source

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Abstract

Holography is applied in every field extensively in recent years, but there are some limitations in the part of display which haven't been breakthrough. For example, people need to change viewpoint to observe the changing colors of the dot-matrix hologram. This research aims at the part of the light source, and uses "Light-emitting diode" as the light source for reconstructing holograms. The point of this thesis is to combine holography with LED to represent all-round display form and improve the way of viewing hologram.

The research begins with the induction of the integration of technology and LED, and explores the relation between LED media and holography. Take advantage of the features of LED including its varied colors, varied formation, and pixel style, combining these features with holography to construct a principle of LED media applying on holography. The conclusions through the experiments prove that LED certainly influences the illumination of reflection hologram, transmission hologram, and dot-matrix hologram. The results are shown below:

(1)LED makes an obvious influence on reflection hologram on its luminance.

The luminance of the hologram changes with different LED lights illuminate on the plate, but there is no variation of its original color.

- (2) In the part of transmission hologram, the stereo effect of the image is not as good as the image on reflection hologram. However, there are three primary colors mixing and overlapping on the plate.
- (3) It breaks through the limitation of dot-matrix hologram which people need to move their viewpoints in order to see the various colors. People now could directly observe different colors on a horizontal viewpoint when applying LED to illuminate the plate.
- (4) The result of this research proves that the integration of holography and LED has broken through the limitation of display form in the past, and it finally represents a rich and brand new visual experience for human beings.

Key words: Holography, LED, Light-Emitting Diode