

Analysis of Quantum Dot Radiation in the Diffusive Material by Monte Carlo Simulation

Youngjin Jeon, Jongha Park and Hwi Kim.

Department of Electronics and Information Engineering, Korea University, 2511

E-mail: hwikim@korea.ac.kr

1. Introduction

Recently, in the display industry fields, quantum dot(QD) display has been actively researched. To measurement and analyze the quantum dot display, we developed the optical analyzing simulation tool based on Monte Carlo method [1]. In this presentation, we will introduce simulation method of analyzing quantum dot radiation in the diffusive material.

2. Results and Discussion

When blue backlight is incident on the QD panel, red and green light is emitting by quantum dot. And, emitting light is scattered by the diffusive material. In this state, ideally, scattered light should be uniformly distributed. Therefore, to find ideal structure of quantum dot panel, we simulate quantum dot radiation in the diffusive material by Monte Carlo method.

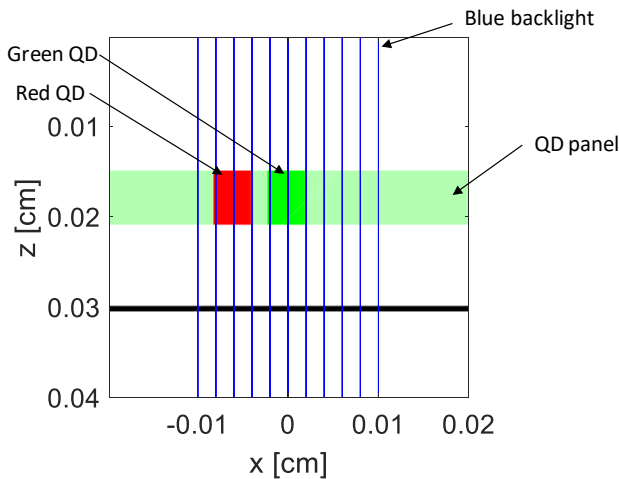


Figure.1. Simulation structure of quantum dot display

Figure.1 is simulation structure of quantum dot panel. Thickness of quantum dot panel is 6μm and wavelength of blue backlight is 473nm. To simulate quantum dot radiation field, three steps are required. First, calculate excitation field of blue backlight as shown in figure.2. Second, calculate radiation field of red and green quantum dot radiation as shown in figure.3. Lastly, summate excitation field and radiation field. After these steps, we can obtain total field.

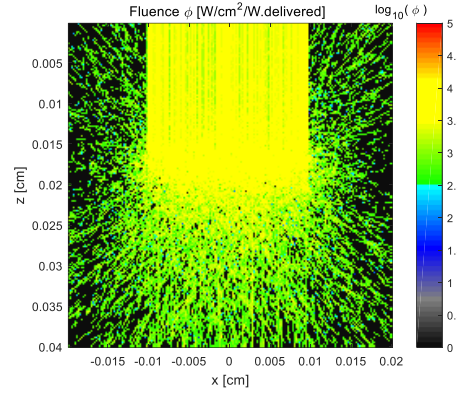


Figure.2. simulation results of blue backlight

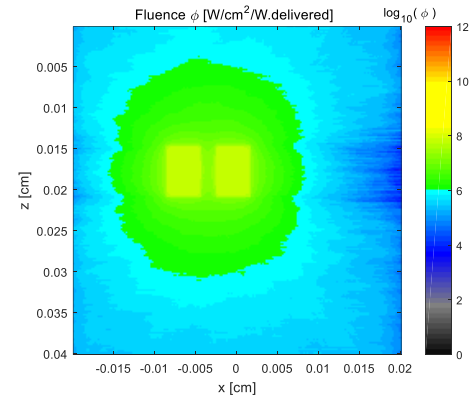


Figure.3. simulation results of red and green radiation

In this presentation, we will discuss about simulation method of obtaining optical properties of radiation field by Monte Carlo method.

References

- [1] S. A. Prahl, M. Keijzer, S. L. Jacques, A. J. Welch, "A Monte Carlo Model of Light Propagation in Tissue" SPIE Institute Series Vol. IS 5, pp. 102-111 (1989)
- [2] Francesco Pederiva, C. J. Umrigar, and E. Lipparini, "Diffusion Monte Carlo study of circular quantum dots" Phys. Rev. B 68, 089901 (2003)