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Abstract
Due to the evaluation of Light Emitting Diodes (LEDs) technologies, their performance in both luminance and color saturation are pushed further to the edge. This leads to their applications in Backlight Units (BLUs) designs. However, LEDs are point light sources. How to convert point light sources into a surface light source has become one of the most important issues in the BLU industry. For direct-type LED BLUs, R, G, B color mixing has become a topic of interest because of the problem of non-uniformity of color. The problem is further complicated by incorporating the scattering effect of diffuser plates in direct-type LED BLUs designs. This study is aimed to resolve this problem by a well-performed optical model for diffuser plates programming in ASAP.
LEDs are considered by most to be monochromatic light sources. However, a commercial LED exhibits multichromatic characteristic. As known, the hazing effect of a diffuser plate is related to the wavelength of the incident light. Therefore, the wavelength effect as well as other effects, such as the diameters of scatters, the concentration of scatters, the relative refractive indices, and the thickness of a diffuser plate, etc., all play a part in color mixing. In this study, all above effects on LED coloring mixing are investigated thoroughly. The arrangements of LEDs and the distance between a diffuser plate and LEDs all contributing to the non-uniformity of color, in addition to the effects of diffuser plate, are also under investigation.
A surface light source with uniform luminance and color is achieved by using a optimal combination of the above parameters.
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