

## **Design and Control of a RGB LED System**

Chun-Wen Tang, Fu-Cheng Wang and Bin-Juine Huang

### **Abstract**

This paper proposes a novel control structure for a red-green-blue (RGB) light-emitting diode (LED) lighting system, and applies multivariable robust control techniques to regulate the color and luminous intensity outputs. The most important feature for a polychromatic illuminant is color adjustability; however, for lighting applications using RGB LEDs, color is sensitive to temperature variations. Therefore, in this paper we propose a robust control system for achieving luminous intensity and color consistency for RGB LED lighting. First, we found a multivariable electrical-thermal model to describe the dynamics of RGB LED lighting system, and used a feed-forward controller to compensate temperature and power variations. Second, we applied robust control algorithms for feedback control design. Finally, the designed controllers were implemented to regulate the luminous and chromatic outputs of the system. From the experimental results, the proposed multivariable robust control structure was deemed effective in providing steady luminous intensity and color for RGB LED lighting.