

An optimization system for LED lens design
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Abstract

This study proposed a two-stage LED lens design optimization system, and used the viewing angle and the luminance uniformity as the optical quality objective. Optical design software (TracePro) and the orthogonal table of Taguchi method were used for simulation experiment. In the first stage, the viewing angle was used as the optical quality objective to find out the preliminary optimization of lens shape. The optimal LED lens size parameter combination of the first stage was used in the second stage to create L25(56) orthogonal table, and then the Back-Propagation Neural Network (BPNN) was used to establish the LED lens quality predictor to predict the FWHM angle and luminance uniformity in different overall sizes. The Genetic Algorithm (GA) with the quality predictor was used to find out the optimum design parameter combination of overall size according to the required quality objective. A LED with wide viewing angle and high luminance uniformity was taken as an example in this study to design a LED optical lens with 135° FWHM angle and 93.35% uniformity.

Keyword : LED, Taguchi method, Back-Propagation Neural Network, Genetic Algorithms