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现代应用光学

基于模糊综合评判法评价发光二极管灯具的可靠性

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摘要: 基于数学模糊综合评判法建立了一种发光二极管(LED)灯具可靠性评价的模型。首先,从LED光源、散热系统、使用环境3个方面对影响LED灯具可靠性的因素进行了分析,建立了评价LED灯具寿命的因素集、评判集;然后,采用德尔菲调查法得到了各因素相应的权重系数;最后,通过选择合适的模糊算子建立了灯具可靠性评价模型。利用所建立的模型对一款LED路灯的可靠性进行了评价,结果表明:所建立的数学模型可以快速、有效地评价LED灯具系统的可靠性。利用所建立的模型,不仅可以节省寿命试验成本,还可为早期失效产品的筛选及产品质量管理提供依据。

关键词: 发光二极管灯具 可靠性 模糊算法 评价模型

Evaluation of reliability for LED lamp based on fuzzy algorithm

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Abstract: An evaluation method for the reliability of Light Emitting Diode(LED) lamps was established based on fuzzy comprehensive evaluation algorithm. Firstly, the major factors which affect the reliability of LED lamps were studied from three aspects on the LED light source, heat-removal system and working environments, and a factor set and an evaluating set for the LED lamp lifetime were built up at the same time. Then, the weighing coefficient of each factor was obtained based on Delphi evaluation method. Finally, the evaluation model for the reliability of LED lamps was built up by choosing appropriate fuzzy operators. The reliability of a LED streetlight lamp was evaluated using the evaluation model. The results show that the designed model can evaluate the reliability of LED lamps quickly and effectively. It not only can save the experiment cost, but also can provide the foundation for screening failure products and managing product quality.

Keywords: Light Emitting Diode(LED) lamp reliability fuzzy algorithm evaluation model

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